Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

JULY 28, 1947
VOLUME 36, No. 15

AMERICAN DYESTUFF REPORTER

GREENVILLE PUBLIC LIBRARY
AUG

None so fast

Try, if you will, any direct green on cotton or rayon and you are certain to find none so fast to light as *Solophenyl* Fast Blue Green B L* (Pat.)

That it is again available in reasonable quantity gives many mills, anxious to make it a staple in their drug room, the opportunity to establish it.

Literature and samples are available for the asking—

**Registered U. S. Patent Office*

GEIGY COMPANY, INC.
89-91 BARCLAY STREET NEW YORK—NEW YORK

Boston · Providence
Philadelphia · Charlotte
Chicago · Portland, Ore.
Toronto

Geigy
Dyestuff Makers Since 1859

In Great Britain
The Geigy Co., Ltd.
National Buildings
Parsonage, Manchester

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

CUT YOUR PROCESSING COSTS

WITH Cyanamid SULPHONATED OILS

A Wide Range of Superior Oils

is becoming more generally available as Cyanamid's channels of raw material supply continue to open up.

AMONG CYANAMID PRODUCTS FOR THE TEXTILE INDUSTRY ARE . . . AQUASOL* Sulphonated Castor Oils, NO-ODOROL* Finishing Oils, DECERESOL* OT Wetting Agents, Penetrants, Softeners, Finishes, Sizing Compounds, PARAMUL** 115 Water Repellent, and other specialties and Heavy Chemicals.

For low-cost chemical equivalent of distilled H_2O . . . FILT-R-STIL* Demineralizing Units.

**Trade-mark *Reg. U. S. Pat. Off.

Yes! Cyanamid sulphonated oils will help you cut right through one of your most pressing problems. For when you use Cyanamid sulphonated oils, you put increased efficiency and dependable performance to work *cutting your costs* by improving your processing. For the absolute uniformity and high quality of Cyanamid oils—made possible through large-scale production methods—eliminate costly guesswork and help achieve excellent results every time.

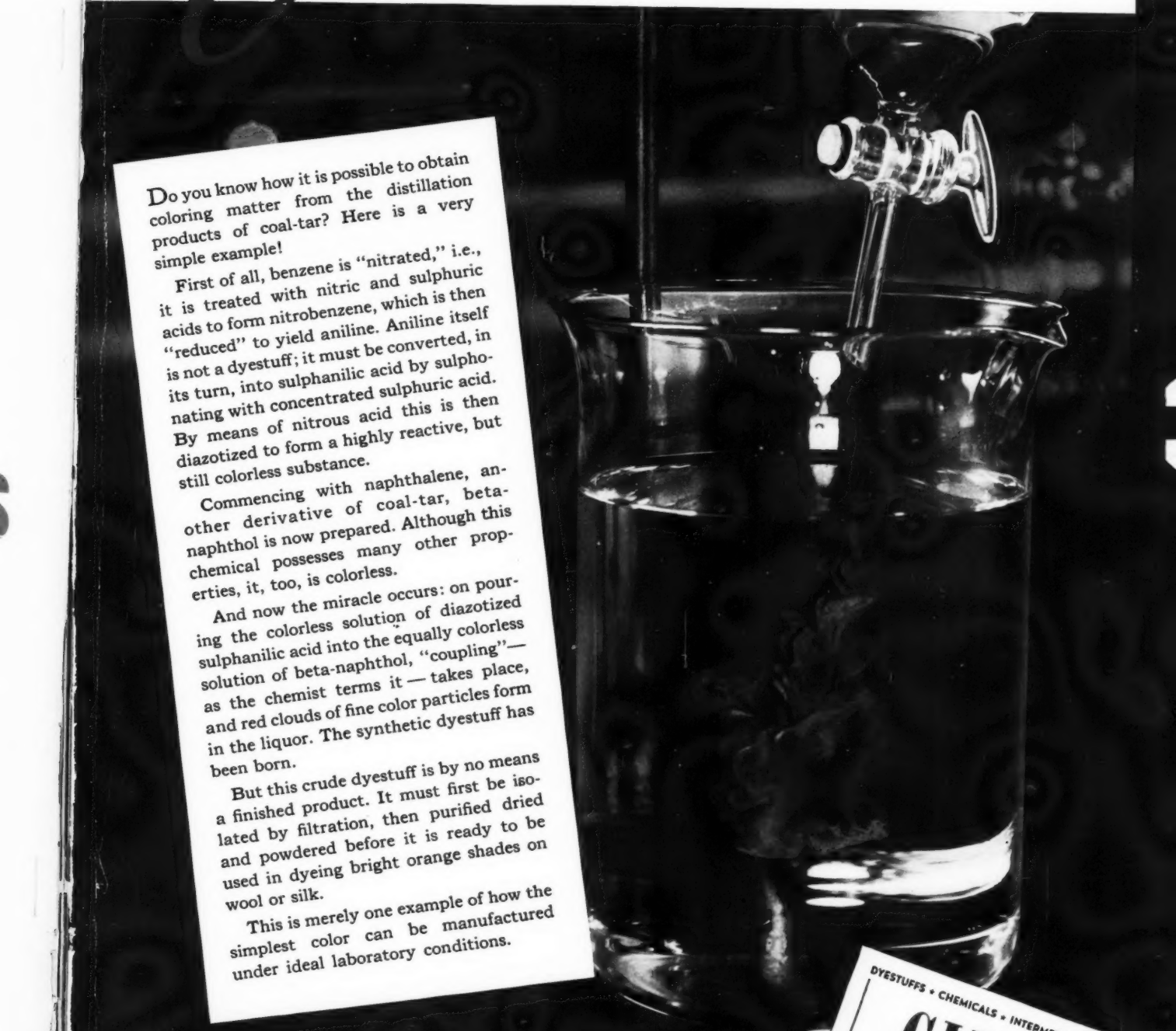
Industrial Chemicals Division

AMERICAN CYANAMID COMPANY

30 ROCKEFELLER PLAZA • NEW YORK 20, N. Y.

American Dyestuff Reporter, Vol. 36, No. 15, July 28, 1947. Published every other Monday. Copyright, 1947, by Howes Publishing Co., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00; Foreign, $6.00. Entered as second-class matter, Nov. 6, 1919, at the New York, N. Y., Post Office, under the act of March 3, 1879.

Ciba DYESTUFF GLIMPSES



Do you know how it is possible to obtain coloring matter from the distillation products of coal-tar? Here is a very simple example!

First of all, benzene is "nitrated," i.e., it is treated with nitric and sulphuric acids to form nitrobenzene, which is then "reduced" to yield aniline. Aniline itself is not a dyestuff; it must be converted, in its turn, into sulphanilic acid by sulphonating with concentrated sulphuric acid. By means of nitrous acid this is then diazotized to form a highly reactive, but still colorless substance.

Commencing with naphthalene, another derivative of coal-tar, beta-naphthol is now prepared. Although this chemical possesses many other properties, it, too, is colorless.

And now the miracle occurs: on pouring the colorless solution of diazotized sulphanilic acid into the equally colorless solution of beta-naphthol, "coupling"— as the chemist terms it — takes place, and red clouds of fine color particles form in the liquor. The synthetic dyestuff has been born.

But this crude dyestuff is by no means a finished product. It must first be isolated by filtration, then purified dried and powdered before it is ready to be used in dyeing bright orange shades on wool or silk.

This is merely one example of how the simplest color can be manufactured under ideal laboratory conditions.

DYESTUFFS • CHEMICALS • INTERMEDIATES

CIBA COMPANY INC.

Greenwich & Morton Sts.

NEW YORK

BOSTON · CHICAGO · MONTREAL · CHARLOTTE
PROVIDENCE · SAN FRANCISCO · PHILADELPHIA

VAT DYES OF THE DOW CHEMICAL COMPANY

NO DIRECT COLORS ARE FASTER TO LIGHT
THAN CHLORANTINES

A finish that lasts for the life of the hose!

ETERNALURE D-15

Resin Finish for Nylons

ETERNALURE D-15 one-treatment finish tightens and clarifies the stitch on any denier hose without sacrifice of length. It not only adds to hosiery "eye appeal," but provides notable snag resistance. Hose has a good body without undesirable stiffness. The finish lasts for the life of the hose.

But from the viewpoint of the finisher, Eternalure D-15 has many processing advantages:

- It is easy to use without changes in equipment or operations.
- A single treatment is required. No assistants. No curing.
- Hose does not stick to and deposits do not build up on forms.
- On sheer hose Eternalure D-15 gives a body which insures easy handling after boarding.
- Treated hose can be handled with a minimum of pull threads.
- Adequate dulling is provided without danger of chalky deposits.

Moreover, Eternalure D-15 has no primary irritating action, and no sensitizing effects on human skin.

Ask for Demonstration

onyx

RESIN FINISHES FOR HOSIERY

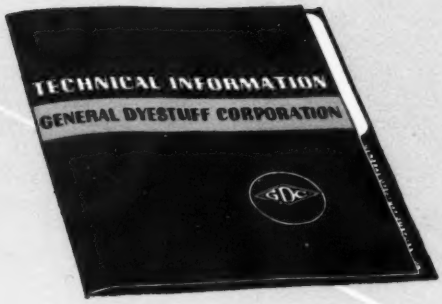
Onyx Oil & Chemical Company

JERSEY CITY 2, N. J.

CHICAGO • PROVIDENCE • CHARLOTTE • ATLANTA • LOS ANGELES

In Canada: Onyx Oil & Chemical Co., Ltd. Montreal, Toronto, St. Johns, Que.

For Export: Onyx International Jersey City 2, N. J.



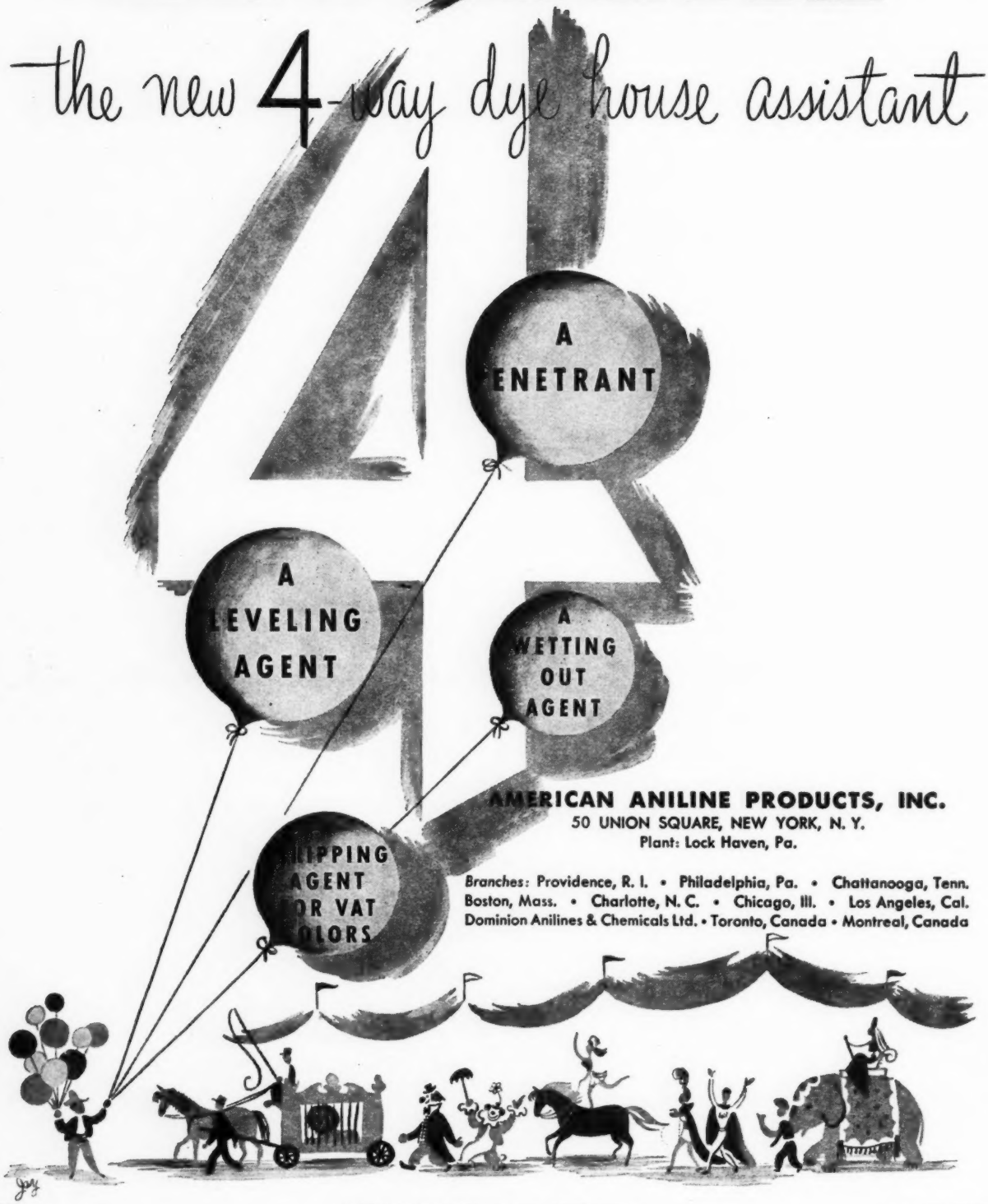
technical service...this term includes the many types of service rendered by a technical service laboratory. The dyestuff concern which undertakes these technical functions must use that essential extra ingredient of sound judgment...judgment which manifests itself in logical conclusions based on sound knowledge...General's technical service is founded on years of intensive laboratory research...and practical mill experience.

GENERAL DYESTUFF CORPORATION

435 HUDSON STREET · NEW YORK CITY

LEVELENE

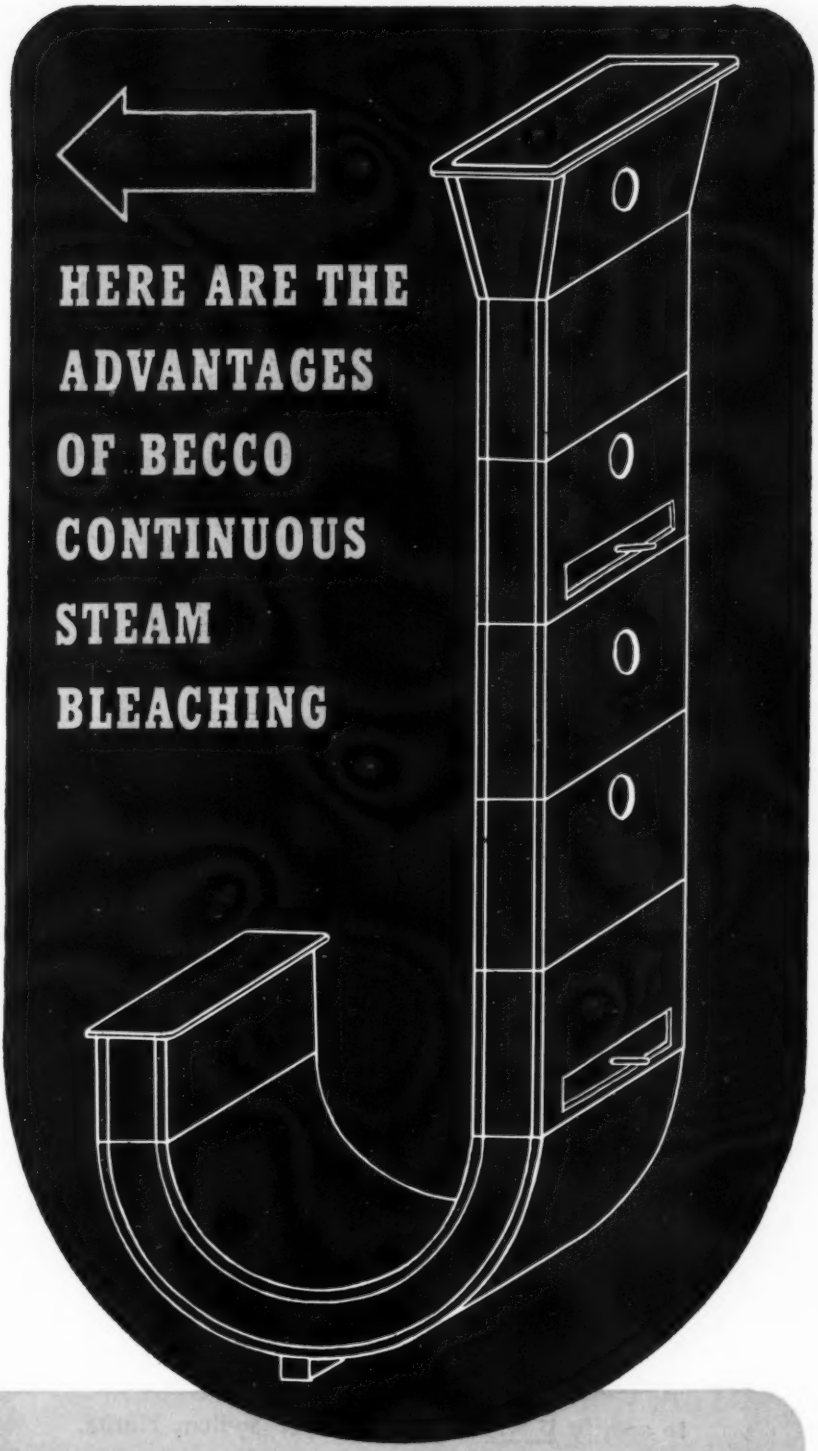
the new 4-way dye house assistant



AMERICAN ANILINE PRODUCTS, INC.
50 UNION SQUARE, NEW YORK, N. Y.
Plant: Lock Haven, Pa.

Branches: Providence, R. I. • Philadelphia, Pa. • Chattanooga, Tenn.
Boston, Mass. • Charlotte, N. C. • Chicago, Ill. • Los Angeles, Cal.
Dominion Anilines & Chemicals Ltd. • Toronto, Canada • Montreal, Canada

HERE ARE THE ADVANTAGES OF BECCO CONTINUOUS STEAM BLEACHING



● With the Becco Continuous Steam Bleaching System there is a substantial saving in equipment because two "J" Boxes will do the equivalent work of nine kiers. There is a saving of up to 55 per cent in floor space. Savings in steam up to 75 per cent are effected. In kier boiling, if the bleach is unsatisfactory, there is a time loss of 18 to 24 hours. In the Becco system, inspection windows in the "J" boxes permit checking at any stage and each yard of goods is bleached in approximately two hours. Savings up to 40 per cent in the cost of chemicals and labor are achieved.

Remember, too, that Becco Hydrogen Peroxide is easy to handle. Shipped in tank cars or drums, it can be pumped quickly and directly to the point of use.

Becco Engineers and Chemists have had many years of specialized bleaching and processing experience. Why not request that they make a survey of your plant and advise as to the most efficient method of bleaching for you to use, regardless of the volume of textiles bleached? You will be under no obligation. Simply write to:

BECCO SALES CORPORATION

AGENTS FOR BUFFALO ELECTRO-CHEMICAL COMPANY, INC.

2 Sawyer Avenue, Buffalo 7, N. Y.

New York Boston Philadelphia Chicago Charlotte

COLOR

color

DEVELOP YOUR COLORS WITH SOLVAY SODIUM NITRITE (U.S.P.)

The secret of quality azo dyes

In azo dyes, a sure way to develop the finest colors is to specify U.S.P. *quality* SOLVAY Sodium Nitrite.

SOLVAY SALES CORPORATION

Alkalies and Chemical Products Manufactured by The Solvay Process Company

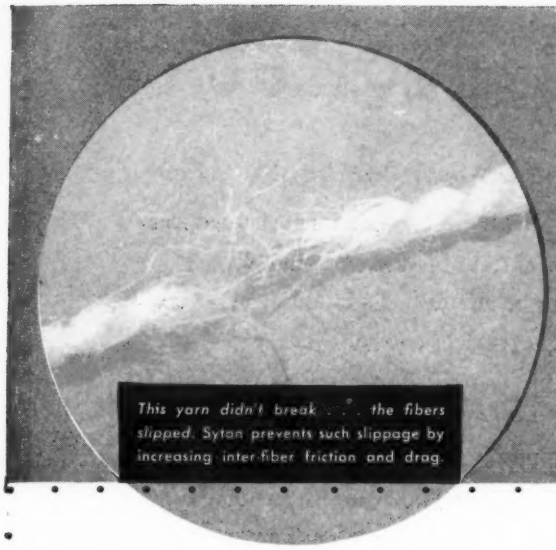
40 Rector Street **New York 6, N. Y.**

BRANCH SALES OFFICES:

Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit • Houston New Orleans • New York • Philadelphia • Pittsburgh • St. Louis • Syracuse

SOLVAY SODIUM NITRITE (U.S.P.)

Specify Quality—Specify SOLVAY



This yarn didn't break . . . the fibers slipped. Syton prevents such slippage by increasing inter-fiber friction and drag.

SYTON

a new chemical that improves worsteds . . . with fiber drag

Fiber drag . . . usually considered the enemy of speed and quality in worsted production . . . has been put to work with good effect by Monsanto textile chemists.

With this revolutionary development, Syton, it is now possible to create effective beneficial and interfacial drag between fibers.

These results promise new high standards in textile production.

1. Yarn strengths have been increased up to 40%.
2. Fabrics from Sytonized yarns are finer.
3. Important economies in manufacture have been effected.

WHAT IS SYTON?

Syton is a colloidal dispersion in water of highly polymerized silica. It is a carefully purified, non-abrasive particle with a diameter of less than 1/400,000 of an inch.

HOW DOES IT WORK?

As fibers are treated with a solution of Syton these sub-microscopic particles coat the fibers, leaving there a tough, non-tacky, translucent film that greatly increases the co-efficient of friction between fibers.

advantages of Syton in worsted spinning

Six important advantages result from the application of Syton, the first basic chemical improvement for worsted spinning practice in 40 years:

1. Reduction of twist, without strength loss.
2. Produces loftier yarn.
3. Reduces aging time after oiling.
4. Has reduced ends down on spinning frame up to 50%.
5. Produces more uniform yarn.
6. Cuts spinning time and cost.

If you or your technicians want to read the full report on this new Monsanto textile chemical, write: MONSANTO CHEMICAL COMPANY, Textile Chemicals Department, 140 Federal Street, Boston 10, Massachusetts.

Syton: Reg. U. S. Pat. Off.

MONSANTO CHEMICALS — PLASTICS

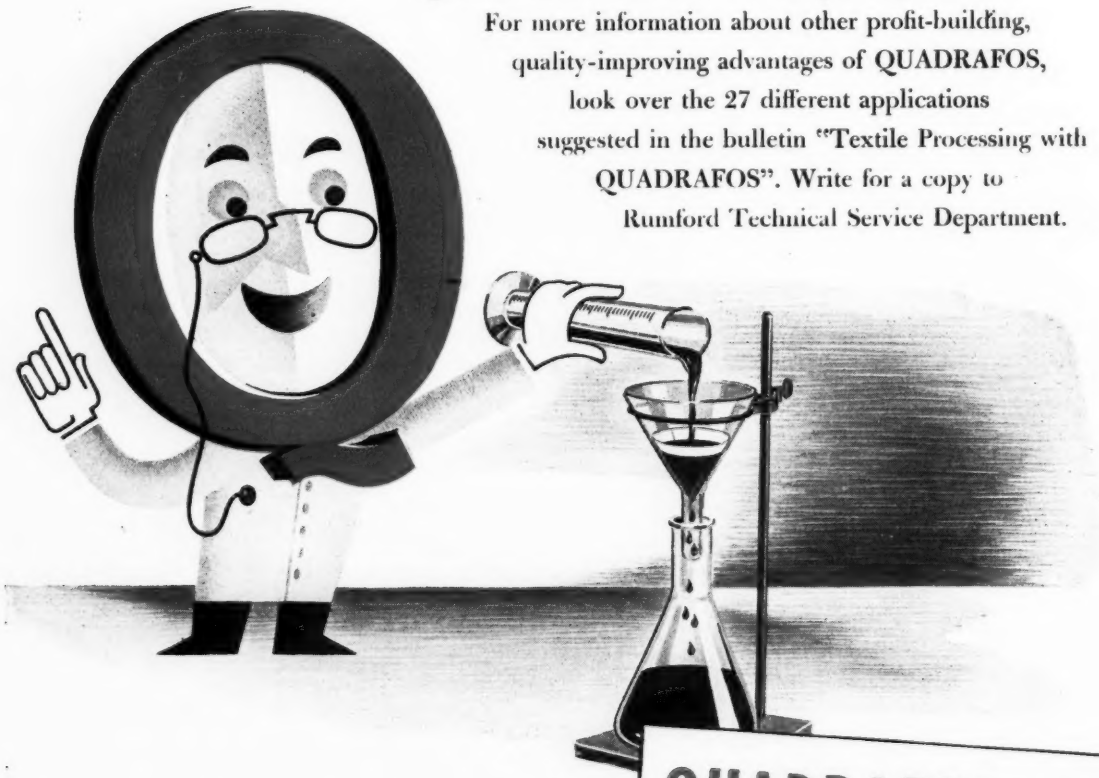
SERVING INDUSTRY...WHICH SERVES MANKIND

One-Way Ticket

How QUADRAFOS* Steps Up Soil Removal

Embedded soil and grime are quickly broken down and floated away in the scour when QUADRAFOS puts them on a one-way ticket that prevents them from being carried along to the next operation . . . You can readily discover why QUADRAFOS maintains perfect control over these undesirable "passengers". Add a little manganese dioxide to a graduate containing a dilute solution of QUADRAFOS. You'll wait hours for it to settle out because the action of QUADRAFOS keeps it in suspension. Then filter the solution. The significant fact is that the suspended matter rides right through the filter along with the water . . . This ability to break up soil into small particles and keep them from being redeposited is one of the ways QUADRAFOS steps up soil removal . . . turns out goods in better condition for subsequent operations.

For more information about other profit-building, quality-improving advantages of QUADRAFOS, look over the 27 different applications suggested in the bulletin "Textile Processing with QUADRAFOS". Write for a copy to Rumford Technical Service Department.



softens water without precipitation...deflocculates ...redissolves precipitates...promotes free rinsing

QUADRAFOS

*U. S. Reg. Trademark
for Sodium Tetraphosphate made by Rumford

RUMFORD CHEMICAL WORKS
20 Newman Ave., Rumford 16, R. I.

EASTONE RED B

For Plain or Dischargeable Dyeing of Acetate Rayon and Nylon

EASTONE RED B, because it dyes acetate rayon an unusually fast red with a bluish cast, is unique among red acetate dyestuffs. Light concentrations of the dye produce soft, neutral shades of pink. It dyes nylon a bright rubine shade.

Eastone Red B dyes and levels exceptionally well over temperatures ranging from as low as 140°F to the boil. It is especially recommended for low temperature dyeings and has proved to be a valuable color for both jig and box work wherever rapid penetration and good build-up characteristics at low temperatures are desired. General commercial fastness of Eastone Red B is good—particularly fastness to light and washing, gas fading, crocking, and sublimation when steamed under pressure.

Eastone Red B is one of a wide variety of Eastman Acetate Dyestuffs especially developed for acetate rayon. For information on these dyestuffs, write to TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.

Eastman

ACETATE DYESTUFFS

A HABIT TO JOE...

"NEW IDEA" TO HIS NEPHEW

...YET BOTH WANT THE SECURITY your P.S. Plan Provides

HAVE YOU told all your new or recently hired employees about the benefits of the Payroll Savings Plan for the regular purchase of U. S. Savings Bonds? Wage earners, according to a recent nation-wide survey, want security more than anything else. They prefer security to big pay, soft jobs, authority, "success."

There is no surer way to this peace of mind than systematic savings. And what surer, safer, better means can your employees find than payroll allotments for U. S. Savings Bonds? Bonds that return $4 at maturity for every $3 they invest!

Your active support of the Payroll Savings Plan is an investment in employee contentment, in the citizenship of your community, and in the security of America's future. This is practical "employee relations" of the highest type and pays dividends of satisfaction to everyone.

Start a drive today for larger participation in the plan. Many employees may be unfamiliar with its advantages. If you want literature for distribution, contact your State Director of the Treasury Department's Savings Bonds Division.

New Savings Bonds Plan won't affect the P.S.P.

THE Treasury Department and the banks of America are making it possible for farmers, doctors, and other self-employed people to participate in "automatic" Bond buying by special arrangement with their banks. This extension of the Savings Bonds program is not a partial payment plan and is intended *only* for people who are not in a position to take advantage of the Payroll Savings Plan.

The Treasury Department acknowledges with appreciation the publication of this message by

AMERICAN DYESTUFF REPORTER

This is an official U.S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

Afghan made entirely from 5-gram matched samples gathered from National Aniline's nationwide application laboratories.

WHEREVER COLOR IS USED

SPECIFY *National Aniline Dyes*

NATIONAL ANILINE DIVISION • ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET, NEW YORK 6, N.Y. BOSTON • PROVIDENCE • PHILADELPHIA • CHICAGO • SAN FRANCISCO • PORTLAND, ORE. GREENSBORO • CHARLOTTE • ATLANTA • NEW ORLEANS • CHATTANOOGA • TORONTO

Artistry in .. Chemistry

VELVAMINE K-90

An improved softening and finishing agent for use on all types of fabrics. It imparts an odorless finish which is resistant to washing and dry cleaning. Can be used as a substitute for sulphonated oils, tallows and other softeners. Its use eliminates yellowing and rancidity often encountered with the usual fatty type of softening agents.

PERMALENE SOL

A penetrant and cleanser designed for use on all fabrics especially those that are tightly woven and highly twisted. Recommended for pad-dyeing where it insures uniform and thorough penetration. It is of great assistance where low temperature dyeings are necessary. Non-foaming at high speeds, it is stable in neutral, alkaline and acid solutions.

VELVAMINE GF

Velvamine GF is a blend of amines and softeners designed to protect acetate colors from gas or fume fading. It resists removal by drycleaning and, when used on mixed fabrics, has a minimum effect on the shade and light fastness of the direct colors. Velvamine GF produces a soft, full hand and does not affect the appearance of the treated fabrics.

PERMALENE WS

A white powder soluble in water at 80° F. Capable of dispersing iron, calcium and magnesium salts and redissolving or re-dispersing precipitated compounds of these metals. It is so highly buffered that the pH of its solution is practically independent of its concentration.

REFINED PRODUCTS CORPORATION

LYNDHURST • NEW JERSEY

* Manufacturers of **PERMA-CIDE**, the approved, outstanding, mildew-proofing agent

Southern Representative: DYER S. MOSS, 1301 Liberty Life Bldg., Charlotte, North Carolina

New England Representatives: E. L. LEGG, P. O. Box 597, Providence, R. I.
CLARENCE E. MOSS, 19 Wilson Ave., Rumford (16) R. I.

Canadian Selling Agents: Carbic Color and Chemical Co., Inc., 56 McNab Street South, Hamilton, Ontario

Exporting Agent: Chem-Cal Company, 82 Wall St., New York City.

Valuable additions to our line of . . .

Pharmasols

Brown 2G produces a bright yellow Brown of excellent fastness to washing at a low cost.

Brown R produces a warm Brown of general all-around fastness.

Seal Brown yields a deep Brown at low cost and is of good all-around fastness.

THE THREE NEW BROWNS PRODUCE DESIRABLE TAN SHADES WHEN PRINTED IN REDUCED STRENGTH

THESE NEW BROWNS,
especially Seal Brown and Brown R, are easy to apply and show a very pronounced improvement in their

FASTNESS TO LIGHT

against our former Browns

CARBIC COLOR AND CHEMICAL CO., INC.
451-453 Washington Street, New York City

BRANCHES:
PHILADELPHIA
PROVIDENCE HAMILTON, ONT.
CHARLOTTE, N. C.

IMPORTERS OF THE MANUFACTURES OF
DURAND & HUGUENIN S. A.
BASLE, SWITZERLAND

EXCLUSIVE DISTRIBUTORS OF
PHARMASOLS
PHARMOLS
PHARMACINES

Representative: Los Angeles (Hathaway Allied Products)

AMERICAN DYESTUFF REPORTER

LOUIS A. OLNEY, D.Sc
Directing Editor

NORMAN A. JOHNSON, B.T.C.
Managing Editor

MYRON D. REESER
Advertising Manager

GRACE B. BURTON
Production Manager

M. H. MORGAN
Circulation Manager

Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

•

Published every other Monday by
HOWES PUBLISHING COMPANY, INC.
One Madison Avenue, New York 10, N. Y.

A. P. HOWES
President

C. R. HOWES
Vice President

H. F. CRAWFORD
Treasurer

M. D. REESER
Secretary

C. ESSENBREIS
Asst. Secretary

•

Also Publishers of
KNIT GOODS WEEKLY
TEXTILE COLORIST
AND CONVERTER

•

July 28, 1947

VOLUME 36 NUMBER 15

Contents

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

• Special Articles

The Degradation of Untreated Cotton Fabrics Exposed to Weather in a Sub-tropical Climate..... 405
J. D. Dean and R. K. Worner

Solubilization in Textile Processing..... 411
Joseph W. Creely

• Departments

Abstracts from Contemporary Journals..... 417

Patent Digest 418
Paul Wengraf

Trade Notes—New Products..... 420

• Proceedings of the American Association of Textile Chemists and Colorists

Membership Applications P413, P415

Year Book to be Changed in Size and Format....P413

Communication P414

Committee for Intersectional Contest.....P414

Summer Outing, Piedmont Section.....P414

Employment Register P414

Calendar P415

Copyright, 1947, Howes Publishing Co., Inc.

IT'S TRUE...

IF ALL THE PAPER AND PAPERBOARD CONSUMED IN THE UNITED STATES LAST YEAR HAD BEEN MADE INTO A PAPER BAND **ONE MILE WIDE**, IT WOULD REACH 11,140 MILES **PAST** THE MOON!

IT'S TRUE OF ESSO SOLVENTS

IF ALL **ESSO PETROLEUM SOLVENTS** SOLD LAST YEAR HAD BEEN USED IN THE MANUFACTURE OF LACQUER, THE GALLONAGE WOULD HAVE TOTALED ENOUGH TO COAT A PAPER BAND **ONE MILE WIDE** AROUND THE EARTH AT THE EQUATOR! CONSTANT UNIFORMITY AND SUIT ABILITY MAKE **ESSO PETROLEUM SOLVENTS** DEPENDABLE FOR INNUMERABLE COMMERCIAL USES, AND HUNDREDS OF INDUSTRIES USE ONE OR MANY OF THE 11 DIFFERENT GRADES. MAY WE SERVE YOU?

STANDARD OIL COMPANY OF NEW JERSEY
Elizabeth, N. J.—Baltimore, Md.—Richmond, Va.—Charleston, West Va.—Charlotte, N. C.—Columbia, S. C.—New Orleans, La.—Little Rock, Ark.—Memphis, Tenn.

STANDARD OIL COMPANY OF PENNSYLVANIA
Philadelphia, Pa.
COLONIAL BEACON OIL COMPANY
Boston, Mass.—New York, N. Y.

SANDOZ PRESENTS *The color achievement of the month*

Pace Setters BY INTERWOVEN

It's socks like these that have given Interwoven its reputation for keeping out front in the men's fashion race... have made Interwoven the world's largest manufacturer of men's socks.

Since "socks appeal" comes largely from color, Sandoz is proud to be among those suppliers whom Interwoven designers can count upon in creating sales-attracting designs. Sandoz dyestuffs—in addition to providing the perfect dyeing qualities that a mass producer like Interwoven must have—stand up under service, joining with top-quality yarn and artful construction to give the customer the longest possible satisfactory wear.

Sandoz products widely used for half hose are fast-to-washing Azoform and Viscoform colors for cotton and rayon, and the Xylene Milling and Sulfonine colors for wool and nylon. A typical Sandoz specialty is Thiotan RS used with selected dyestuffs for producing white wool and nylon effects in mixed hose or for obtaining more solid results on wool-cotton blends.

For acid, chrome or direct dyes... or auxiliary chemicals... for both natural and synthetic fibres... be guided by the successful "color achievements" you have been seeing in these Sandoz advertisements. Sandoz application laboratories are located in New York, Boston, Charlotte, Philadelphia, Los Angeles and Toronto, where stocks are carried. Branches in Chicago, Paterson and Providence.

SANDOZ CHEMICAL WORKS, INC., 61 VAN DAM STREET, NEW YORK 13, N. Y.

SANDOZ *thinks ahead with textiles*

SANDOZ

YOUR COTTON WILL "COTTON" TO

so DESIZE WITH EXSIZE

YES, FOR COTTON CLOTH or cotton mixed cloth Exsize is the dependable-economical finisher. For this concentrate of natural enzymes has not a trace of acids... harsh alkalis or destructive chemicals.

In other words, Exsize does right by your cloth, leaving it soft, with elastic feel —a good "hand."

And, what's just as important Exsize does right by your budget. For scientific tests show that this famous Pabst product works efficiently, dilutes quickly, and actually desizes hundreds of yards of cloth for only a few pennies.

Just get in touch with our Pabst Technical man . . . he'll help you solve your toughest desizing problems . . . either in your mill or our own laboratories.

WRITE FOR FREE BOOKLET

PABST BREWERIES

PABST
SALES COMPANY
CHICAGO, ILLINOIS
Warehouses at Jersey City, and Textile Warehouse Company, Greenville, S. C.

Copr. 1947, Pabst Brewing Company, Milwaukee, Wisconsin

SYNTHETIC DETERGENTS

ANILINE COLORS
NATURAL DYESTUFFS
SIZINGS and FINISHING MATERIALS

UNITED
CHEMICAL PRODUCTS
CORPORATION

Main Office:
753 MONTGOMERY STREET • JERSEY CITY 6, N. J.
Plant:
YORK AND GOLGATE STREETS •• JERSEY CITY 2, N. J.
Branches:
GREENSBORO, N. C. • PAWTUCKET, R. I.
Western Agents: CHEMICAL PRODUCTS CO., AURORA, ILL.

QUALITY **RICHMOND** PRODUCTS

CUT DOWN DYEHOUSE
Headaches
USE

DYETEX

- Disperses Dyestuff
- Scours
- Used in Scrooping

DYETEX

Send for free sample and full information

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA.

AMERICAN
DYESTUFF REPORTER

VOLUME 35 JULY 28, 1947 NUMBER 15

The Degradation of Untreated Cotton Fabrics Exposed to Weather in a Sub-tropical Climate

J. D. DEAN and R. K. WORNER

Southern Regional Research Laboratory[1]
New Orleans, Louisiana

Introduction

IT is common experience that textiles progressively deteriorate in out-of-doors service until replacement ultimately becomes necessary, but it is by no means simple to analyze the complex interplay of chemical, physical, and biological forces responsible for the damage. Exposure tests conducted during recent years at the Southern Regional Research Laboratory in New Orleans have contributed in some degree to a better understanding of the manner in which unprotected cotton fabrics are degraded by the action of weather, and have afforded a basis for judging the effectiveness of the various protective treatments that have come under examination. The present paper describes the results obtained in these tests.

Origin and Purpose of Tests

Early in 1942 weather exposure tests of chemically finished cotton fabrics were undertaken at New Orleans in connection with certain research projects of the Armed Forces. The wide variations in breaking strength losses observed among untreated control samples exposed at different times directed attention to the necessity of establishing, if possible, dependable patterns of average or year-round weathering for exposed untreated cotton fabrics, as an aid in interpreting more intelligently the performance of the chemically finished samples. Patterns of this kind were also much needed as standards of reference in work then in progress on accelerated aging of cotton.

The expedient was therefore adopted of exposing several samples of selected fabrics at spaced intervals throughout a year. By combining the degradation data secured from replicates that had been exposed for equal periods of time but through different combinations of months, it was hoped to arrive at a composite result of weather exposure that would both indicate and at the same time largely average out the extreme variations due to seasonal and climatic changes, thus affording a useful guide for tests made during any part of the year.

Previous Investigations

There was available a rather extensive literature dealing with the various types of degradation in cotton cellulose that result from the action of both natural and artificial agents. In the more limited section concerned with the destructive effect of weather on cellulosic fibers, the work of several authors was of especial interest in connection with the contemplated exposure tests.

In 1929 Searle *(1)* reviewed existing information on the nature of biological decay in textiles and determined the strength losses and viscosities in linen and cotton fabrics degraded by fungi and bacteria. Since he found that cellulosic materials tendered by microorganisms showed no apparent change in cuprammonium viscosity, he suggested that this fact might serve as a basis for distinguishing between microbiological decay and light tendering, and therefore emphasized the importance of examining the combined effects of microorganisms and light in the deterioration of fabrics during weather exposure. Searle's conclusions on the lack of viscosity change in biologically degraded cellulose were confirmed in 1939 by Thaysen and associates *(2)* in their studies of the effects of climatic exposure on textiles.

In 1933 and 1935 at College Station, Texas, Grimes *(3)* carried out extensive exposures to sunlight of cotton fabrics of various types. Records were kept of meteorological conditions, and the effect of sunlight on breaking strength, copper number, and color of the exposed samples was determined.

These and other publications afforded useful information in the general field of cotton fabric degradation. It was clear, however, that environmental conditions of exposure largely determined the results secured, and that the desired basic data on the effects of weather in the climate of southern Louisiana must be obtained from tests conducted in the local area. Since this is one in which mildew is prevalent during the greater part of the year, it was of particular interest to observe the part played by this factor in the degradation of exposed fabrics.

Climatic Conditions

With respect to its influence on cellulosic materials, weather may be regarded as a combination of several destructive forces which operate in varying proportions and intensities, but among which the effects of sunlight and microorganisms are usually the most important. Other degradative factors include wind action, changes in moisture and temperature conditions, shrinkage and relaxation of fabrics, traces of corrosive gases in the atmosphere, and the like. The damage

[1] One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

suffered by an exposed fabric is the resultant of these interacting forces, which in turn are affected by the prevailing climatic conditions. In a desert area, for example, it may be assumed that the photochemical action of sunlight is the chief destructive factor, while in warm and moist regions biological action becomes of increasing importance. In the present study, the possible destructive action of forces other than sunlight and microorganisms has been disregarded, since the exposure tests supplied no data by which the specific effects of these other forces could be measured.

Situated on the thirtieth parallel of north latitude, in close proximity to the Gulf of Mexico, New Orleans possesses a climate that for the greater part of the year is both warm and moist. Records show that during the past 28 years *(4)* the annual rainfall has averaged about 60 inches, the mean temperature was close to 70° F., and the average relative humidity ranged from 84 percent at 6:30 a.m. to 62 percent at noon and 71 percent at 6:30 p.m. Total annual hours of sunshine are approximately 2630, amounting to about 60 percent of possible sunshine. Combining as it does long periods of hot sunshine with heavy rainfall and temperature-moisture conditions extremely favorable to the growth of microorganisms, this climate subjects exposed fabrics to degrading influences that are probably not surpassed in severity elsewhere in the United States.

Cotton Fabrics Tested

Weather exposure tests were made with several different cotton fabrics ranging from an army duck weighing 10.1 ounces per square yard to a print cloth weighing 2.8 ounces per square yard. Construction details for these fabrics are given in Table 1.

Multiple-Sample Exposures

The first test involving the use of several samples was begun in the fall of 1942 with the standard gray (loomstate) 7-ounce osnaburg. Six replicates, each 18 inches wide and 6½ feet long in the warp direction, were cut from a large piece of cloth. The first sample was put out to weather in October, to be followed by the rest in succession at 2-month intervals. The samples were stapled down on open-backed supports built for the purpose in an unshaded area of the laboratory grounds. These supports faced south, sloped at an angle of 45° from the vertical, and had the lower edge about 30 inches above the ground. A general view of this exposure field is shown in Figure 1.

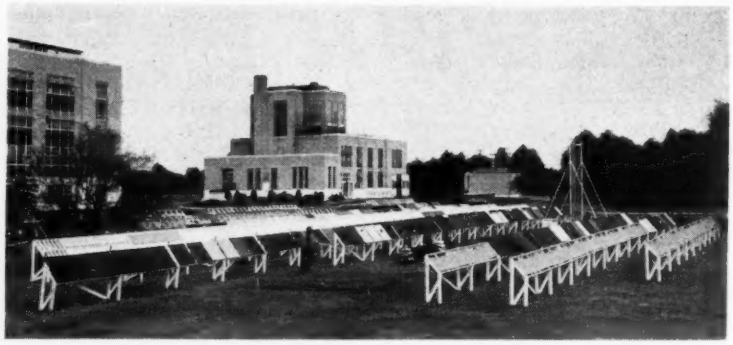


Figure 1

General view of Weather Exposure Testing Field Southern Regional Research Laboratory, New Orleans, La.

After each month of exposure, portions measuring 6 inches warpwise by 18 inches fillingwise were cut from all samples for analysis, and when the final sample had completed 13 months in place, degradation data from all six were averaged for each month. When the sixth sample of osnaburg had been put in place it was decided to extend the exposure test by another set of six samples; so, with a slight break in the spacing interval, a seventh sample was added and the process continued until the twelfth and last was put out to weather in July 1944, completing its period out-of-doors in August 1945. The entire test thus afforded a composite result of weather exposure averaged from 12 replicate samples and extending over a total of 34 months.

The same general procedure was followed in the subsequent tests started during 1943 and 1944. The gray army duck series consisted of 10 samples; the other sets, all of lighter cloths, were of 6 samples each. Including the above-decribed osnaburg set, the complete list of multiple-sample exposures is as follows:

Fabric (Common name)	*Number of Samples in Set*	*1st Sample Exposed*
Osnaburg (gray)	12	Oct. 1942
Army duck (gray)	10	Jan. 1943
Twill (kierboiled)	6	Sept. 1943
Print cloth (gray).....	6	May 1944
Print cloth (bleached)....	6	May 1944

In addition, a few smaller sets were employed for special studies of biological and seasonal effects on degradation of cotton.

Criteria of Degradation

In general, changes observed in the breaking strength and in the cuprammonium fluidity (reciprocal of viscosity) served as measures of the degradation suffered, although the appearance of the exposed samples was often significant. Losses in breaking strength of weathered fabrics indicate the extent of physical damage, while increases in the fluidity reveal the progressive molecular breakdown, or depolymerization, that occurs in the cotton cellulose.

Breaking strength determinations were made according to standard methods on a pendulum-type machine, the specimens first having been conditioned in an atmosphere of 65 ± 2 percent relative humidity at 70 ± 2° F. In the early part of the work, the grab method was used and averages were based on five specimens. This practice was soon replaced by the raveled strip method, using 10 specimens for an average. The latter method appeared somewhat more reliable since it permitted a larger number of specimens to be averaged and the same number of threads always to be broken. All breaks were made of warp threads, and the strength losses were calculated as percents of the warp breaking strength in pounds of the original unexposed fabrics.

The fluidities are given as reciprocal poises or rhes. The cuprammonium re-

TABLE 1
Cloth Specifications

Fabric Description	*Weight (gray basis) oz./sq. yd.*	*Thread Count (gray basis)*		*Warp Breaking Strength (Average)*
		W	*F*	*Lbs/in.-Strip method*
Duck, army, 8 oz.....	10.1	55	42	163
Osnaburg, 7 oz.....	6.5	32	28	61
Print cloth, gray.....	2.8	64	60	40
Print cloth, bleached.....	2.8	64	60	45
Sheeting, gray	5.6	48	44	64
Sheeting, kierboiled	5.6	48	44	65
Twill, kierboiled	5.6	96	64	96

agent used in all measurements contained 30 grams of copper per liter and corresponds to the specifications of the Committee on Viscosity of Cellulose of the American Chemical Society *(5)*, since this composition was found by Conrad *(6)* to dissolve raw cotton more readily than one containing less copper. The method used was that described in Conrad *(7)*, which provides a velocity gradient adjustment. Preparatory treatments of the specimens included extraction for 6 hours in a Soxhlet apparatus with 95% ethyl alcohol, rinsing in distilled water, air-drying, and grinding in a Wiley mill with a 20-mesh screen.

The large number of samples involved in these exposure tests and in other concurrent investigations of fabric degradation rendered it impossible to secure fluidity values for all the weather exposure sets. Moreover, the fluidities which were determined for the first six samples of the osnaburg set after each month of exposure indicated that trends could be fairly well established by less frequent measurements. Therefore in subsequent exposure sets, the 3, 6, 9, and 12 month point were generally selected.

Results

In Tables 2-6, inclusive, breaking strength losses are shown for all fabric sets through 13 months of exposure. In Tables 7, 8, and 9 are given the aavilable fluidities in rhes for the osnaburg, duck, and kierboiled twill sets.

Discussion of Results

General

Surveyed as a whole, the data given in the tables make clear the non-uniform nature of the destructive process to which these samples were subjected. Extremely wide variations are evident among both the strength and fluidity changes that occurred in replicate samples during equal periods of exposure, and the frequent lack of agreement between amount of deterioration and time of exposure that is observed in individual samples indicates an unevenness of attack over the fabric surfaces that caused much irregularity among the successive portions withdrawn for analysis.

In general, greater variations in strength losses occurred among the gray than among the kierboiled or bleached goods, while in both these types the variations in fluidity values after equal periods of exposure appeared to be less extensive than was the case with the corresponding strength losses. Although these differences in degradation criteria are less pronounced among the commercially purified

TABLE 2

Effect of Weather Exposure on Breaking Strength of Gray Osnaburg

Sample No.	Date Exposed	Breaking Strength Loss as Percent of Original (Months Exposed) 1	2	3	4	5	6	7	8	9	10	11	12	13
1	Oct. 1942	7	19	24	28	22	46	44	48	51	63	73	65	70
2	Dec. 1942	6	19	13	12	16	29	35	41	43	52	60	67	65
3	Feb. 1943	8	12	20	33	39	37	50	41	40	55	58	55	69
4	Apr. 1943	15	14	11	19	42	47	70	73	74	79	75	79	70
5	June 1943	16	24	22	50	49	39	35	50	58	55	53	70	72
6	Aug. 1943	17	24	26	41	42	42	43	52	48	65	43	50	58
Average	1-6 inclusive:	12	19	19	31	35	40	46	51	52	62	60	64	67
7	Sept. 1943	9	17	21	50	30	25	28	42	47	61	64	86	79
8	Nov. 1943	3	4	10	10	21	24	27	41	54	61	68	69	68
9	Jan. 1944	3	8	10	15	17	50	51	56	55	69	68	71	66
10	Mar. 1944	4	10	18	24	40	60	63	72	77	75	78	70	80
11	May 1944	9	18	39	57	56	61	65	67	66	64	75	75	77
12	July 1944	19	32	65	67	79	79	85	83	83	91	90	93	94
Average	7-12 inclusive:	8	15	27	37	41	50	53	60	64	70	74	77	77
Average	1-12 inclusive:	10	17	23	34	38	45	50	56	58	66	67	71	72

TABLE 3

Effect of Weather Exposure on Breaking Strength of Gray Duck

Sample No.	Date Exposed	Breaking Strength Loss as Percent of Original (Months Exposed) 1	2	3	4	5	6	7	8	9	10	11	12	13
1	Jan. 1943	1	11	15	21	44	42	40	59	62	50	58	67	77
2	Mar. 1943	11	10	16	19	22	27	27	32	35	39	43	42	42
3	May 1943	14	40	28	36	50	57	42	45	43	51	62	54	63
4	July 1943	7	12	20	32	31	43	32	37	42	43	45	59	64
5	Sept. 1943	8	28	19	28	28	26	39	36	37	54	47	59	63
6	Nov. 1943	8	17	14	29	27	27	31	40	45	51	57	59	55
7	Jan. 1944	0	6	13	17	16	25	27	33	59	46	51	56	58
8	Mar. 1944	7	16	17	27	32	65	64	68	44	70	85	78	69
9	May 1944	13	20	32	41	53	52	59	57	58	61	69	70	70
10	July 1944	16	27	47	60	66	69	61	75	79	85	71	83	87
Average		9	19	22	31	37	43	42	48	50	55	59	63	65

TABLE 4

Effect of Weather Exposure on Breaking Strength of Kierboiled Twill

Sample No.	Date Exposed	Breaking Strength Loss as Percent of Original (Months Exposed) 1	2	3	4	5	6	7	8	9	10	11	12	13
1	Sept. 1943	23	33	36	31	38	44	50	47	52	56	69	75	72
2	Nov. 1943	30	27	32	36	47	47	53	56	65	68	75	79	76
3	Jan. 1944	19	29	42	42	42	49	59	69	68	73	74	79	80
4	Mar. 1944	27	24	37	48	55	68	70	75	74	77	80	80	81
5	May 1944	19	31	52	54	58	59	64	68	71	74	75	81	81
6	July 1944	36	43	51	59	51	63	59	71	67	70	69	76	81
Average		26	31	42	45	49	55	59	64	66	70	74	78	79

TABLE 5

Effect of Weather Exposure on Breaking Strength of Gray Print Cloth

Sample No.	Date Exposed	Breaking Strength Loss as Percent of Original (Months Exposed) 1	2	3	4	5	6	7	8	9	10	11	12	13
1	May 1944	9	25	40	47	53	57	54	60	62	72	68	71	79
2	July 1944	24	38	50	44	49	70	62	67	70	77	82	94	..
3	Sept. 1944	20	11	18	36	35	28	38	41	43	56	62	66	67
4	Nov. 1944	3	16	26	28	39	41	50	62	69	71	79	78	85
5	Jan. 1945	14	16	31	32	46	57	64	63	64	65	73	68	73
6	Mar. 1945	24	24	27	30	42	47	51	53	63	62	59	66	72
Average		16	22	32	36	44	50	53	58	62	67	71	74	75

TABLE 6

Effect of Weather Exposure on Breaking Strength of Bleached Print Cloth

Sample No.	Date Exposed	Breaking Strength Loss as Percent of Original (Months Exposed) 1	2	3	4	5	6	7	8	9	10	11	12	13
1	May 1944	36	48	60	62	70	65	74	78	76	80	..	..	..
2	July 1944	39	42	54	57	51	68	66	65	68	76	79	81	87
3	Sept. 1944	24	42	38	54	54	50	61	59	63	65	72	77	78
4	Nov. 1944	11	23	33	34	46	45	52	63	65	69	72	74	81
5	Jan. 1945	8	12	24	39	44	59	64	70	71	71	78	79	..
6	Mar. 1945	16	19	34	43	54	58	64	69	74	71	72	76	..
Average		22	31	41	48	53	58	64	67	70	72	75	77	82

TABLE 7

Effect of Weather Exposure on Fluidity of Gray Osnaburg

Sample No.	Date Exposed	Fluidity in Rhes (Months Exposed) 0	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Oct. 1942	2	6	7	8	9	9	11	12	16	15	15	21	20	23
2	Dec. 1942	2	4	6	7	8	9	17	16	18	23	23	26	28	25
3	Feb. 1943	2	5	12	15	24	21	21	22	20	23	26	25	24	31
4	Apr. 1943	2	4	7	7	8	10	13	12	16	17	16	18	19	21
5	June 1943	2	5	6	9	10	12	14	13	15	17	18	19	19	23
6	Aug. 1943	2	5	6	6	7	9	10	10	12	11	14	14	18	21
Average 1-6 inclusive:			5	7	9	11	12	14	14	16	18	19	21	21	24
7	Sept. 1943	2			9			18			20			24	
8	Nov. 1943	2			12			17			24			27	
9	Jan. 1944	2			11			14			20			26	
10	Mar. 1944	2			9			19			20			23	
11	May 1944	2			10			13			20			21	
12	July 1944	2			9			15			21			27	
Average 7-12 inclusive:		2			10			16			21			25	
Average 1-12 inclusive:		2			10			15			20			23	

TABLE 8

Effect of Weather Exposure on Fluidity of Gray Duck

Sample No.	Date Exposed	Fluidity in Rhes (Months Exposed) 0	3	6	9	12
1	Jan. 1943	2	9	23	28	32
2	Mar. 1943	2	10	29	20	21
3	May 1943	2	12	15	19	21
4	July 1943	2	8	11	14	17
5	Sept. 1943	2	7	14	16	20
6	Nov. 1943	2	11	13	21	20
7	Jan. 1944	2	9	9	17	20
8	Mar. 1944	2	10	15	16	21
9	May 1944	2	11	14	16	20
10	July 1944	2	10	15	18	24
	Average	2	10	16	19	22

TABLE 9

Effect of Weather Exposure on Fluidity of Kierboiled Twill

Sample No.	Date Exposed	Fluidity in Rhes (Months Exposed) 0	3	6	9	12
1	Sept. 1943	3	16	26	30	38
2	Nov. 1943	3	22	26	31	32
3	Jan. 1944	3	20	26	29	35
4	Mar. 1944	3	19	31	34	33
5	May 1944	3	27	25	31	34
6	July 1944	3	23	29	31	36
	Average	3	21	27	31	35

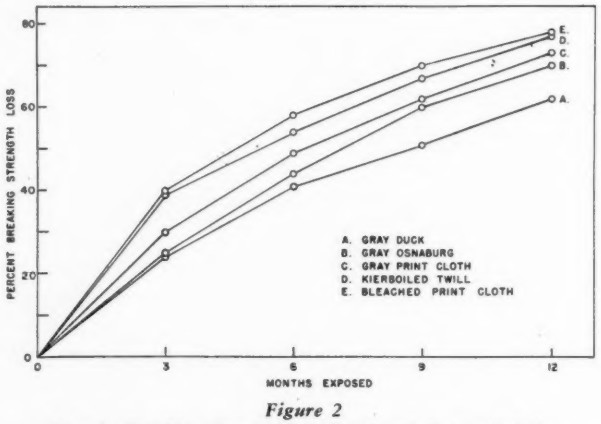


Figure 2

Loss in Breaking Strength of Weathered Cotton Fabrics
Curves shown in this figure have been slightly smoothed by using at the selected points values secured by averaging the percent strength loss observed at that month with those of the months immediately preceding and following.

than among the gray cloth samples, it is interesting to note that total strength and fluidity changes of the former are distinctly greater in magnitude.

Notwithstanding the irregularities found among individual samples in these sets, the averaged results form consistent patterns of weathering degradation. Allowing for the different weights and constructions of the fabrics tested, the progressive strength loss patterns formed by the five sets exhibit marked conformity, and for the heavier gray osnaburg and duck the average fluidity changes are in close agreement.

From a statistical standpoint it may appear that little significance can be attached to values averaged from such divergent results obtained from a relatively limited number of samples. A study of the available data, however, indicates that in these year-round exposure sets the extreme variations in degradation due to seasonal and climatic changes cancel out to such an extent that it is doubtful if multiplication of samples would significantly affect the trends here established.

Strength Losses

From the standpoint of practical service, the loss of breaking strength in fabrics during exposure to weather is usually the most important feature of the damage suffered. The comparative performances in this respect of the different cotton constructions are shown clearly in Figure 2, where averaged percent strength losses at intervals of 3 months are plotted against time of exposure.

In view of the widely differing types represented by the three gray fabrics, it was expected that considerable divergence would occur among their average strength losses during a year of weather exposure. The total losses observed, however, were not entirely dependent on the original fabric weights. The 10-ounce gray army duck, a high-grade, closely woven cloth made of plied unsized yarns, retained on the average 38 per cent of its original breaking strength. Corresponding values for the 7-ounce osnaburg and 2.8-ounce print cloth, both made of single yarns with sized warps, were 29 and 27 percent respectively.

Throughout a year of exposure the gray print cloth on the average lost less strength than the heavier kierboiled twill; the latter in turn showed a slight advantage in strength retention over the bleached print cloth.

Fluidity Changes

In Figure 3 the average fluidity values observed at intervals of 3 months for the duck, osnaburg, and kierboiled twill sets

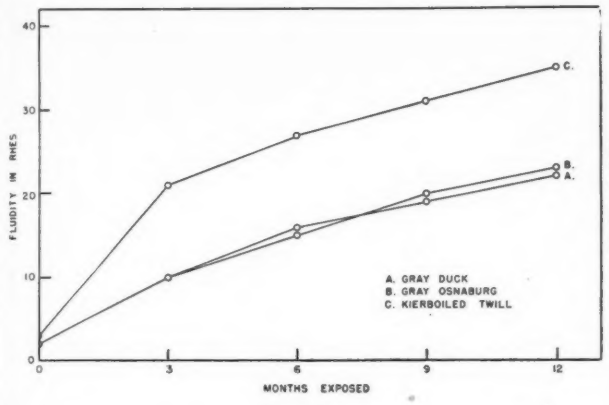


Figure 3

Fluidity Values of Weathered Gray and Kierboiled Cotton Fabrics

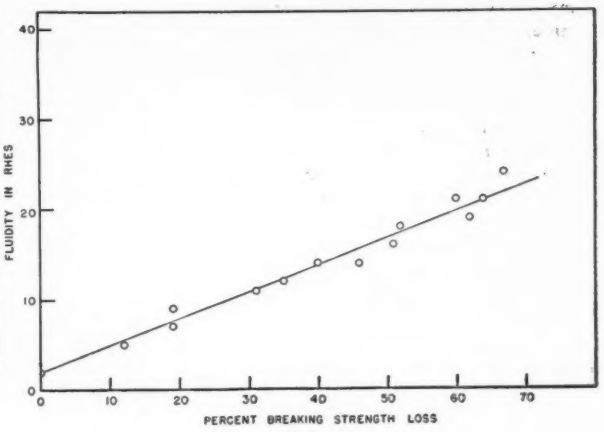


Figure 4

Breaking Strength Loss-Fluidity Relationship at 1-Month Intervals of Weathered Gray Osnaburg

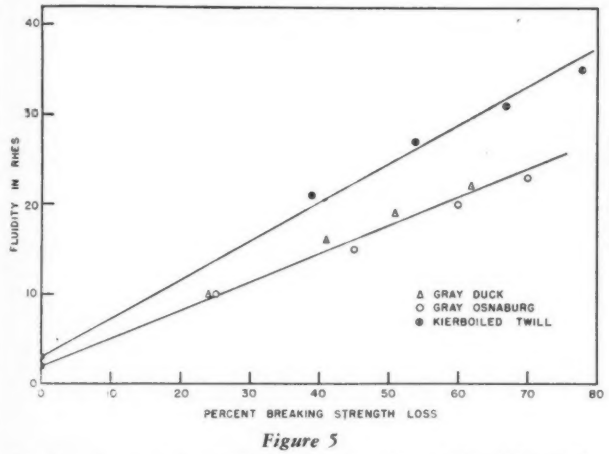


Figure 5

Breaking Strength Loss-Fluidity Relationship at 3-Month Intervals of weathered Gray and Kierboiled Cotton Fabrics

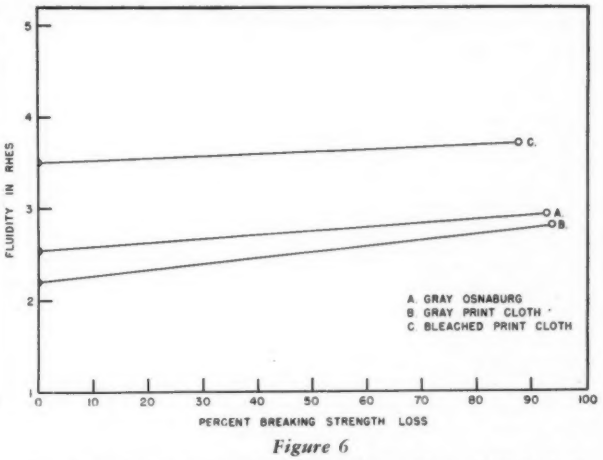


Figure 6

Breaking Strength Loss-Fluidity Relationships of Biologically Degraded Cotton Fabrics

are plotted against time of exposure. The gray duck and osnaburg here show close conformity, while the fluidity values in the kierboiled twill set are in a definitelv higher range. At the beginning of the exposure, the fluidity of the twill was only slightly higher than the fluidities of the gray fabrics, but increased much more rapidly during the first 3 months. From that point on the increases were fairly uniform in both types of cloth.

Fluidity-Strength Relationships

Investigators in the field of cellulose chemistry have shown that when cotton is uniformly degraded by a chemical action such as acid hydrolysis a definite relationship exists between the resulting changes in its strength and fluidity *(8)*. Although the action of weather on exposed fabrics cannot be described as uniform, it still appeared possible that the relationships found to exist between their strength and fluidity changes might throw some light on the mechanism by which breakdown of cotton cloth is effected. Wide variations are apparent in the strength and fluidity changes that occurred among the individual samples in the first six-replicate set of gray osnaburg through a year of exposure (Tables 2 and 7). If, however, the fluidities in rhes of these six replicates at 1-month intervals are averaged and plotted against the corresponding averaged strength losses, as shown in Figure 4, the resulting relationship is practically linear and may be summarized for comparative purposes by the equation: $F = 2 + 0.3S$, where F is fluidity in rhes and S is breaking strength loss in percent.

Utilizing all available data, the averaged strength loss and fluidity values at 3-month intervals for the osnaburg, duck, and kierboiled twill sets were plotted in Figure 5. The duck and osnaburg data which were nearly identical were combined and the two fabrics are here treated as one large set of 22 samples. There is again apparent a marked difference in the degradation patterns formed by the gray and the kierboiled fabrics, the latter being characterized by consistently higher fluidity values at points of equal strength loss.

Biological and Seasonal Effects

There is reason to assume that biological action was largely responsible for the divergence in behavior of the gray and kierboiled fabrics during exposure to weather. The appearance of the gray samples, for example, indicate that they had suffered severely from mildew, while signs of such attack were much less evident in the kierboiled twill. Although

some of the fungi present may have represented types of the superficial molds that do not attack cellulose, the samples that exhibited the heaviest growth of mildew were those that suffered the highest breaking strength losses.

Reference was previously made to evidence *(1, 2)* that cotton fabric may undergo large strength loss from the action of microorganisms without any significant fluidity increase occurring in the surviving cloth. This fact is probably due to the highly localized nature of the biological attack, in which minute areas of cotton are broken down by enzymatic action and the soluble degradation products removed, while adjacent areas remain practically unaffected.

To confirm this effect of purely biological degradation in the present work, samples of gray and bleached print cloths were inoculated with pure cultures of the cellulose-destroying organism *Metarrhizium glutinosum* and incubated until they had lost approximately 90 percent of their original breaking strength. In a parallel test, gray osnaburg was buried under controlled conditions in biologically active soil for 6 days, by which time it had suffered a breaking strength loss of 93 percent. After incubation, the samples were washed gently in tap water to remove extraneous material before extraction for fluidity measurements. No significant fluidity increase was observed in any of these highly degraded samples. Their strength-fluidity relationships are shown in Figure 6.

It was also desirable to study the effect of seasonally influenced biological action on the strength and fluidity of weathered cotton. Three replicate samples each of gray and kierboiled sheeting were therefore exposed during three winter months (January, February, March) of 1946, and identical sets were exposed during three months (June, July, August) of the following summer, the two periods during which biological attack is assumed to be respectively at its lowest and highest points. The changes observed in strength and fluidity are shown in Table 10, where each figure represents the average of three replicate samples.

It was found that after 3 months of winter exposure both gray and kierboiled samples lost approximately 20 percent of their original strength; fluidity, however, in the kierboiled cloth increased from its original of 3 to a maximum of 16 rhes, while in the gray it increased from 2 to a maximum of only 10 rhes. At this time the gray samples showed slight but unmistakable signs of mildew, scattered discolorations of pinhead size appearing on the under side of the cloth, while the kierboiled samples remained visibly unattacked. As a result of the summer exposure, strength losses increased to a total of 41 percent in the kierboiled and 52 percent in the gray samples. The gray cloth at this time was heavily spotted with mildew, but the kierboiled sheeting showed only a light discoloration, chiefly from the growth of a greenish algae-like organism which was presumed to be noncellulolytic in nature. A photograph of the under or shaded side of both fabrics after 3 months of summer exposure is reproduced in Figure 7. In the gray samples, although total summer strength losses exceeded those of winter exposure hand, in the kierboiled cloth the fluidity change was actually less. On the other hand, in the kierboiled cloth the fluidity rise observed during the summer exposure was somewhat greater than that of the winter months.

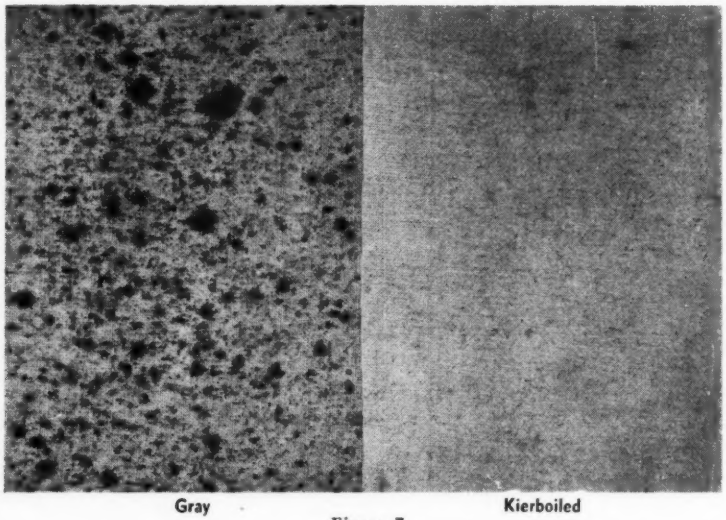


Figure 7

Biological Attack of Gray and Kierboiled Sheeting after 3 Months Exposure in Summer

The different types of degradation that characterized the gray and the kierboiled sheeting when exposed during these two seasons were in general agreement with results secured in the multiple exposure sets of gray duck, gray osnaburg, and kierboiled twill (Tables 2, 3, 4, 7, 8, and 9). After 3 months of exposure made with starting dates between the months of November and January, inclusive, six samples of duck and osnaburg (considered as one fabric) showed an average strength loss of 12.5 percent and an average fluidity of 10 rhes. Eight similar samples after 3 months of exposure made with starting dates between May and August, inclusive, showed an average strength loss of 35 percent and an average fluidity of 9 rhes. Two kierboiled twill samples exposed during three winter months had an average strength loss of 37 percent with fluidity of 21 rhes, and two like samples exposed during three summer months had an average strength loss of 52 percent with fluidity of 25 rhes.

To study further the importance of seasonal variation, the data obtained in the multiple-sample exposures were tabulated according to the month of exposure, and the mean strength loss values for gray and purified fabrics and the mean fluidity values for the first set of osnaburg were calculated for bimonthly periods. These periods were used to average out the effect of exposing samples only every other month. From a minimum in the March-April period, both gray and purified fabrics showed a progressive increase in the rate of tendering which reached a maximum in the September-October period.

(Continued on Page 423)

TABLE 10
Effect of Seasonal Exposure on Gray and Kierboiled Sheeting

Type of Sheeting	*Season*	*Percent Strength Loss (Months Exposed)*			*Fluidity in Rhes (Months Exposed)*		
		1	2	3	0	1	2	3
Gray	Winter	8	15	21	2	5	6	10
Gray	Summer	16	26	52	2	5	6	7
Kierboiled	Winter	7	14	20	3	9	11	16
Kierboiled	Summer	17	27	41	3	12	18	20

Solubilization in Textile Processing

JOSEPH W. CREELY

THE phenomenon of solubilization *(4, 6)* consists in the taking up by solutions of soaps and detergents, substances which are otherwise insoluble or very slightly soluble in the solvent medium. The solubilized material is in solution in the sense that it is not present as suspended or protected particles or emulsified droplets, but is incorporated in the colloidal particles of the detergent itself. At least a portion of the solubilized material has been shown by X-ray examination to be present in layers within the lamellar micelles of the detergent. If an organic liquid is shaken with an aqueous solution of a detergent all or a part of it will be solubilized. When the saturation value for solubilization is exceeded, the excess of the organic liquid appears as droplets in an emulsion and causes a steep rise in turbidity. This point of sharp rise in turbidity is used as an indicator for the maximum concentration of material which can be solubilized.

Substances of very low molecular weight are freely solubilized in aqueous soap solutions but the extent of solubilization falls off rapidly with increase of molecular weight. Polar compounds are more readily solubilized than hydrocarbons.

Soaps are made up of polar molecules containing long hydrophobic hydrocarbon chains and hydrophilic groups consisting of carboxyl ions linked with cations by electro-valence. Sodium soaps are soluble in water and in such solutions the water molecules tend to group themselves around the hydrophylic groups:

$$\begin{array}{c} H_2O \\ \hline CH_3 \cdot (CH_2)_n \cdot COONa \\ \hline H_2O \end{array} H_2O.$$

Like parts of the molecules attract each other and in this way colloidal particles, called micelles, are built up. Harkins, Mattoon and Corrin *(3)* have elucidated the structure of soap micelles of various soap solutions. A cross section of a soap micelle in potassium laurate aqueous solution may be pictured as in Fig. 1.

In Fig. 1 the circles represent the hydrophylic part of the soap molecules and the lines connected with these circles represent hydrocarbon chains. X-ray diffraction photographs, when interpreted by the theory of molecular orientation at interfaces, indicate the existence of double layers of soap molecules with water layers between them. In the double layers the hydrocarbon chains are oriented toward each other, with the polar groups toward the water. The micelles appear to be four or more double layers thick. With an ordinary soap the polar groups constitute a negatively charged layer, while the water layer contains diffuse layers of positive ions. The thickness of the water layer depends on the interaction of these ions and is related to the concentration of water in the soap solution.

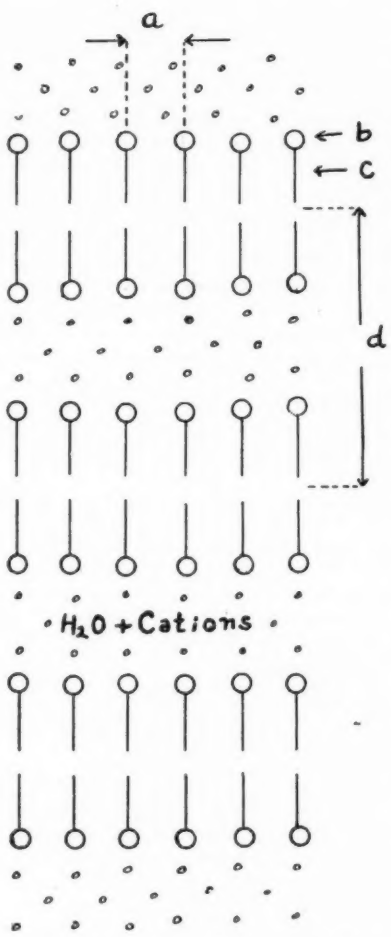


Fig. 1. Cross section of a soap micelle in water. a is the Bragg Short Spacing (4.4Å). b is a negatively charged carboxyl group and c is an alkyl group. b and c constitute a soap ion. d is the micelle layer spacing.

The micelle layer in the soap solution is measurable by X-rays as well as the Bragg short spacings (4.4Å in Fig. 1). In the plane of the layers of soap the Bragg short spacing is found to be nearly constant for many soaps over a wide range of concentrations. The structure in this direction is that of a liquid and is not regular as idealized in Fig. 1.

Every organic liquid that has been investigated is many times more soluble in soap solution (e.g. 10% sodium oleate) than in water. The mixture of sterols, alcohols, hydrocarbons, etc. constituting natural oils, though quite insoluble in water must obviously be soluble in soap solutions, since soaps prepared from such oils yield clear aqueous solutions unless the unsaponifiable content is excessive. Moreover this unsaponifiable matter is retained by the soap with considerable tenacity against the competing solvent effect of extracting solvents.

It has been known for many years that phenol and cresol are more soluble in aqueous soap solutions than in water. Advantage has been taken of this in the preparation of disinfecting solutions. Table I shows the solubility relations in the 3-component system: cresol - water - sodium oleate *(1)*.

From this table it can be seen that if soap is added to water and cresol is dissolved in the water, a larger amount can be made to dissolve than if no soap were added. For example, in the case of m-cresol only 2.4% can be made to dissolve at 20°C. if no soap is added. However as much as 14.1% soap can be added and a solution containing 52.8% m-cresol and 33.1% water will result. If water is dissolved in m-cresol only 12.8% can be made to dissolve before soap is added. It is believed that at least a part of the added solvent is solubilized in soap micelles.

Ordinary soap solutions are poor detergents for high molecular weight hydrocarbons such as grease and bitumens. This is understandable since the degree of solubilization has been found to fall off rapidly with increase in molecular weight in the case of hydrocarbons. If grease is mixed

TABLE I

The System Cresol — Water — Sodium Oleate at 20° C.

(All results are in percentage)

Water	o-Cresol	Sodium Oleate	Water	m-Cresol	Sodium Oleate	Water	p-Cresol	Sodium Oleate
97.2	2.8	—	97.6	2.4	—	98.0	2.0	—
90.2	7.5	2.3	93.6	5.2	1.2	90.8	7.5	1.7
85.8	10.5	3.7	85.5	11.0	3.5	85.0	12.1	2.9
60.2	31.3	8.5	78.8	16.0	5.2	78.7	17.2	4.1
42.0	49.5	8.5	69.2	23.6	7.2	57.2	35.6	7.2
25.3	67.3	7.4	54.5	36.4	9.1	53.5	38.9	7.6
18.9	75.5	5.6	46.4	42.6	11.0	42.1	48.8	9.1
15.9	80.6	3.5	41.6	45.1	13.3	28.6	62.4	9.0
14.7	84.0	1.3	33.1	52.8	14.1	22.8	71.0	6.2
14.2	85.1	0.7	26.2	61.6	12.2	19.5	76.4	4.1
13.9	85.7	0.4	20.3	71.4	8.3	17.2	80.3	2.5
13.7	86.0	0.3	15.1	81.2	3.7	16.4	81.8	1.8
13.6	86.4	—	13.2	84.9	1.9	14.8	85.2	—
			12.8	87.2	—			

with a low molecular weight solvent-soap mixture and then added to soap and water the grease is readily dissolved. Thus it can be seen that greater efficiency in removing such soil is attained if some low molecular weight alcohols, hydrocarbons or chlorohydrocarbons are first solubilized in the detergent solution (Fig. 2). The function of the solubilized solvent is to open up the hydrocarbon layers in the soap micelles enabling them to mix with the larger high molecular weight hydrocarbons and in turn solubilize them.

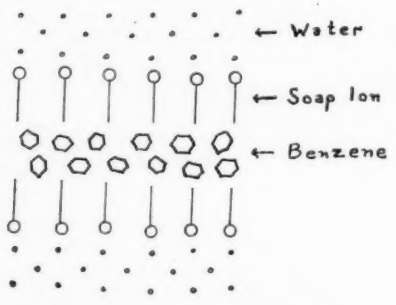


Fig. 2. Cross Section of a Micelle Layer Spacing Containing Solubilized Benzene.

Smith *(9)* found that most organic liquids more soluble in water than about 2% have a definite solubility of 10% or over in 0.4 Nw* (10.8%) aqueous sodium oleate at 20°C., lower the viscosity of the solution and yield unstable emulsions with the soap solutions. Most liquids less soluble in water than 2% have a solubility of less than 10% in 0.4 Nw sodium oleate at 20°C., increase the viscosity of the solution and yield stable emulsions with the soap solution.

Soaps containing a small proportion of unsaponified oil dissolve to a clear solution in water. If ethyl alcohol is added, the solvent power of the soap is reduced because it passes more completely into molecular solution, and the oil is thrown out of solution, rendering the liquid cloudy. This observation forms the basis of a delicate quantitative test for unsaponified oil in soaps or fatty acids *(8)*. The effect of alcohol on aqueous soap solutions is further illustrated in the method for the estimation of the amount of grease in wool scouring liquors described below.

Wool grease, consisting of a mixture of lanolin and free fatty acids, is commonly recovered from the wool scouring liquors in the soap and soda scouring process by heating to about 180°F. and passing through two centrifuges. The first machine is designed to remove mud and the second is for grease recovery. The efficiency of grease recovery may be determined whereby a scouring liquor sample is shaken with alcohol and carbon tetrachloride, then centrifuged and the concentration of grease in the carbon tetrachloride layer determined by evaporation and weighing *(2)*. This method gives the total concentration of grease in the scouring liquor. A test on the liquor entering the centrifuge and one on the effluent suffices to determine the efficiency of grease recovery.

Soap micelles have dimensions of the order of 200-500 Å or .02-.05 microns, whereas emulsified grease particles in a wool scouring liquor would range from about 1 to 10 microns in diameter. This means that the volume of a small emulsified particle would be 8000 to 125000 times as great as that of a soap micelle. This observation together with the fact that the density of micelles containing solubilized grease is not as low as that of emulsified grease shows the impossibility of recovering solubilized grease by centrifuging in ordinary equipment.

Using the above method of analysis it will be seen that the efficiency of grease recovery is best when centrifuging hot liquors and when the soap concentration is low. High temperature tends to break up soap micelles and would lessen the amount of solubilized grease. This would mean that there would be more emulsified grease in hot liquors with a greater chance for centrifugal recovery. Addition of soap or alkali beyond the minimum required for emulsifying the grease results in a great increase in the number of soap micelles and hence of solubilized grease which cannot be removed in the centrifuge.

Crude wool grease may be purified by mixing with hot water and recentrifuging to get a nearly anhydrous grease. Free fatty acids can be removed from this by mixing with hot aqueous ammonia solutions containing a low molecular weight alcohol, mixing and settling. The function of the alcohol is to reduce the emulsifying and solubilizing action of the ammonium soaps formed. The ash content of the grease is also lowered by this procedure.

Unsaponifiable matter, e.g. sterols, can be prepared from wool grease by saponifying with strong aqueous potash in sufficient amount, stirring into the grease and following the course of the reaction by rapid titration of the product in alcohol to the phenolphthalein endpoint. When a constant excess of alkali remains, the product can be separated by dissolving in aqueous solutions of low molecular weight alcohols to suppress the emulsifying power of the soaps and extracting the liquid with an immiscible solvent such as benzene, carbon tetrachloride, ethylene dichloride, etc. Yellow, waxy unsaponifiable substances are recovered from the non-aqueous layer while soaps together with free alkali remain in the aqueous layer.

Stable emulsions of organic solvents can be made in water using 0.5% sodium linoleate as emulsifier. Such emulsions are efficient in removing paint specks from noils when soaked and washed in the emulsion. It is evident that solubilization plays a most important part in depainting since the effectiveness of such a treatment can be increased by reducing the percentage of solvent and increasing the percentage of sodium linoleate to 1.5%. Furthermore, if the solvent is omitted, poor depainting results.

Effective depainting agents which contain solutions of soaps in xylene or other solvents have been on the market. These products on dilution with water yield stable emulsions suitable for depainting. The undiluted products are clear viscous liquids containing soaps, water and solvents. Ammonia has been added in one such product and improved the depainting efficiency. This product attacks copper or brass equipment, due to the ammonia present, and must be used in glass-lined or stainless steel equipment. Otherwise the copper salts which form react with the wool depositing black cupric sulfide which spoils the color of the stock.

McBain, Merrill and Vinograd *(5)* have made hundreds of observations which show that solubilization can occur in non-aqueous solvents. It is probable that nearly any compound can be solubilized if a proper choice of solvent and detergent is used.

Pink *(7)* has shown that solutions of ethanolamine oleate in benzene, toluene and xylene dissolve relatively large amounts of water. Small additions of substances such

(Concluded on Page 424)

*Nw — weight normality or gram equivalents per 1000 grams of solution.

Proceedings of the

American Association of Textile Chemists and Colorists

July 28, 1947

Membership Applications

JUNIOR

Stephen Chwastyk — Analyst, American Cyanamid Co., Calco Chem. Div., Bound Brook, N. J. Sponsors: H. Weiss, R. R. Sleeper.

Malcolm P. Coulman — Asst. Chemist, American Aniline Products, Inc., Boston, Mass. Sponsors: J. H. Binner, W. W. Larkin.

Irwin Finkelstein—Mgr., World Dyeing & Finishing Co., Inc., New York, N. Y. Sponsors: O. H. Demers, A. P. Pelitsch.

William D. Johnston, Jr.—Chemist, Burkart-Schier Chemical Co., Chattanooga, Tenn. Sponsor: A. J. Kelly.

Sidney Kaplan — Dyer, National Dye Works, Inc., Baltimore, Md. Sponsors: G. N. Bond, Jr., R. Robertson.

William McBride—Lab. Asst., American Woolen Co., Lawrence, Mass. Sponsors: A. Morrison, H. D. Grimes.

Betty G. Pugh—Supervisor of Physical Testing Lab., Tennessee Eastman Corp., Kingsport, Tenn. Sponsors: H. A. Thompson, W. G. Faw.

James M. Ross—Secretary, F. H. Ross & Co., Inc., Charlotte, N. C. Sponsors: T. R. Smith, A. G. McNair.

Karl E. Shapiro—Research Chemist, The Manhattan Shirt Co., Paterson, N. J. Sponsors: W. S. Woodson, O. F. Marks.

ASSOCIATE

James A. Burkart—Chem. Engr., Burkart-Schier Chemical Co., Chatanooga, Tenn.

Theodore E. Carlson—Text. Engr., W. R. Grace & Co., New York, N. Y.

Henry A. Goldsmith—Director of Research, Phipps Products, Inc., Dorchester, Mass.

Clyde L. Hawkins—Gen. Mgr. Textiles, Burlington Mills Corp., Havana, Cuba.

M. V. Iyer—Business Mgr., Nagindas Kilabhai & Co., Bombay, India.

Owen Johnson — Asst. Dyer, Charles Lachman Co., Inc., Phoenixville, Pa.

Duncan M. Liles—Plant Mgr., Textiles, Morelos, S. A., Cuernavaca, Mexico.

John D. MacNamara—Sales Engr., Minneapolis-Honeywell Regulator Co., Boston, Mass.

Harold T. Nelson—Chief Chemist, U. S. Rubber Co., Mishawaka, Indiana.

William E. Rettew — Supt., Burlington Mills, Ltd., Rutherford, N.S.W., Australia.

L. Lester Rona—President, L. L. Rona & Co., Inc., New York, N. Y.

Abraham A. Schwartz—Consulting Chemist, American Analytical Labs., Inc., New York, N. Y.

Francis E. Stone—Tech. Develop., A. C. Lawrence Leather Co., Peabody, Mass.

Rune V. Swanstrom—President, AB Rune Swanstrom, Gothenburg, Sweden.

Anthony J. Tirri — Chemical Salesman, Aetna Color & Chemical Co., Inc., East Paterson, N. J.

Enrique Wolfenson—President, Bernardo Wolfenson S.A. Buenos Aires, Argentina.

(Additional Applications on Page P415)

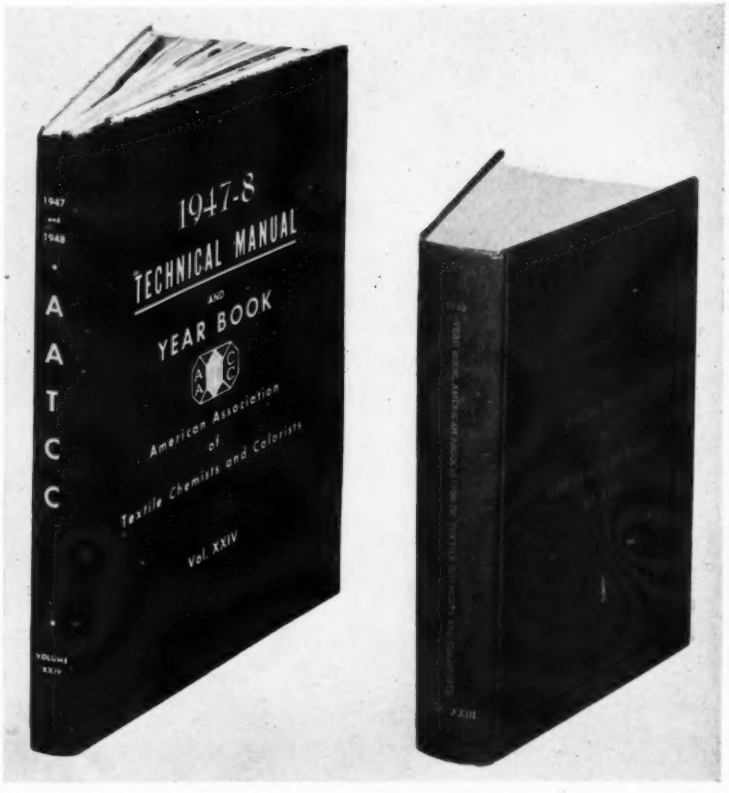
Year Book to be Changed in Size and Format

THE next edition of the Year Book, scheduled for issuance in August of 1948 and designated as the 1947-48 volume, will be considerably changed in size and appearance from the 1946 volume which is now being mailed.

The new book will be increased in page size to that of the REPORTER and will be set up with three columns per page instead of the present one column. This will considerably increase the legibility and attractiveness of the volume. It will make a volume considerably less thick than the current one and will thus be easier to use and carry. The new volume may easily be slipped into a brief case whereas the current volume makes a rather bulky addition. The illustration indicates the difference in size between the 1946 and the 1947-48 volumes.

With a 7 x 10 type page size and a trim size of 8⅛ by 11¼ the new volume will give advertisers the advantage of a considerably enlarged display space.

It is anticipated that in the future the name of the volume will be changed to read "TECHNICAL MANUAL AND YEAR BOOK."



Communication

Re: Proposed Southern New England Section

Dr. J. Edward Lynn,
1937 Main Street,
Stamford, Connecticut.

Dear Dr. Lynn:

I have just read your letter to the Editor in the June 30th issue of the AMERICAN DYESTUFF REPORTER in which you propose the creation of a Southern New England Section as a split-off from the New York Section. You give as reasons for this that it is difficult to hold meetings for the full membership of our Section and that the meetings held in New Jersey are an inconvenience for the Connecticut members.

Our very largest sectional meetings were attended by about 450 which we have been able to accommodate satisfactorily. A split-off of a Connecticut group would hardly alter this situation. As to your second reason, we have long been aware that the holding of meetings in New Jersey is an inconvenience to our Connecticut and Long Island members. Circumstances forced us to do this during the past season. For the coming one, however, it has been decided that at least two meetings will be held in Manhattan. At present it is intended that our January meeting will be held either at the Hotel New Yorker or Pennsylvania and our March meeting at the Engineers' Hall. These locations are all within easy reach of Grand Central Station and would probably be as convenient for the members from southern Connecticut as a meeting in Hartford or New Haven.

Sincerely yours,
H. E. HAGER,
Chairman, New York Section.

—♦ ♦—

Committee for Intersectional Contest

PATRICK J. KENNEDY of E. I. duPont de Nemours & Co., Inc., Chairman of the National Intersectional Contest Committee, has announced the following persons who will serve as members of his committee:

Winn W. Chase—Director of Technical Publicity and Market Research, Textile Colors Division, Interchemical Corp.; National Chairman of Publicity, AATCC; Member of Publications Committee, AATCC.

J. Robert Bonnar—Technical Director, General Dyestuff Corp.; Chairman of Executive Committee on Research, AATCC; Member of Committees on Color Index (Steering Committee and Sub-Committee on Classification and Numbering), AATCC; Member of Research Committee, AATCC; Member of Sub-Committee on Fastness to Light, AATCC.

Frank J. O'Neil—Textile Physicist, Worsted Division, Pacific Mills; Vice-Chairman, Northern New England Section, AATCC; Member of Sub-Committee on Color, AATCC; Member of Sub-Committee on Transference of Color, AATCC.

C. Norris Rabold—Chief Chemist, Union Bleachery; Vice-President, AATCC; Member of Research Committee, AATCC.

Arthur T. Brainerd—Chicago Manager, Ciba Company, Inc.

—♦ ♦—

Summer Outing, Piedmont Section

THE Summer Outing of the Piedmont Section was held June 20 and 21 at the Ocean Forest Hotel, Myrtle Beach, S. C.

Registration began at 12 o'clock noon, Friday the 20th. The afternoon was given to swimming, golfing, and fishing. A dance was held on the Patio from 9:30 P.M. to 1:00 A.M.

Saturday morning found swimming, golfing, and fishing being enjoyed again. A bingo party under the direction of Mrs. Irving Royce of Charlotte, N. C., was thoroughly enjoyed from 3:00 P.M. to 5:00 P.M. Nylon hose were given the ladies and silk neckties to the men. This was the first mixed party of this kind attempted, and it was most successful. About 200 attended the bingo party.

A banquet was served at 7:30 P.M. with a musical program during the meal. Many valuable and interesting prizes were given after the meal. Due to bad weather, a dance was held in the hotel ball room from 9:30 P.M. until 1:00 A.M.

Fred Sprock, Sectional Chairman from Charlotte, was general chairman of the outing.

No certain program was followed, the weekend being devoted to relaxation and a general social occasion. About 400 guests were in attendance.

Respectfully submitted,
R. H. SMITH, *Secretary*

National Convention
CONGRESS HOTEL
Chicago, Ill.
October 23, 24, 25

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information through the code numbers from the Secretary.

47-29

Education: Equivalent of two years college in Germany, and Textile College in Czechoslovakia; also commercial background.
Experience: Finishing, dyeing and laboratory testing in Europe and India; specializing in worsteds, woolens and mixtures; production control.
Age 31; married, has received first papers for U. S. citizenship. Work in metropolitan area preferred; will train, with chances of promotion.

47-30

Education: Graduate, Bradford Durfee Textile Institute.
Experience: Dye laboratory, executive management of dyeing and finishing, various threads, cotton goods, printing.
Age 38; married; references.

47-31

Education: B.Sc. & M.Sc., Philadelphia College of Pharmacy & Science.
Experience: Research chemist, Director of Research & Quality Control, surgical and textile goods.
Age 33; married; references.

47-32

Education: Textile Chemical Engineer, State College, Austria.
Experience: Dyeing and finishing on a variety of fibers and products with executive responsibility, development and sales promotion.
Age 31; married; references; New York City or West Coast preferred.

47-33

Education: Graduate vocational school, with additional college courses in chemistry.
Experience: Laboratory dyeing and testing; dyer of yarns and hosiery with executive responsibilities in dyehouse.
Age 31; married; will go anywhere in U. S.; New York area preferred because residence available.

47-34

Education: Columbia University, one year.
Experience: Laboratory asst., and operator of most machines in bleachery and dye house.
Age 35; married; references; prefers N. E. or N. Y.

Membership Applications

SENIOR

Robert P. Anstell—Supt., Dyeing & Finishing, Vogt Knitting Mills, McMinnville, Tenn. Sponsors: J. Anderson, E. Helms.

Irving Beiley—Asst. to Pres., Colloids, Inc., Newark, N. Y. Sponsors: O. Anderson, A. Malick.

William F. Blair — Chemist, Cloverdale Dye Works, Inc., High Point, N. C. Sponsors: E. L. Caswell, R. H. Smith.

Warren B. Broadbent — Sales Repres., Geigy Co., Inc., New York, N. Y. Sponsors: D. P. Knowland, H. C. Spatz.

Frederick F. Burke — Industrial Sales, Swift & Co., Boston, Mass. Sponsors: R. E. Hale, L. Billings.

Walter R. Burrow — Head Dyer, Kale Finishing Plant, Mebane, N. C. Sponsors: J. A. Parker, C. J. Dulin.

Nelson J. Callahan—Lab. Tech., Cloverdale Dye Works, High Point, N. C. Sponsors: E. L. Caswell, R. H. Smith.

Charles B. Capron — Foreman of Dyehouse, Gloversville Knitting Co., Gloversville, N. Y. Sponsors: N. C. Shane, C. M. Braham.

Joseph N. Caudle—Dyeing & Finishing Whitehall Knitting Co., Mt. Holly, N. C. Sponsors: J. M. Hamilton, W. A. Daniel.

Milton H. Cooper—Dyer, Linwood Lace Works, Inc., Washington, R. I. Sponsors: H. B. Sturtevant, J. K. Wilkie.

Norbert Dardinne—Director, La Societe Carbochimique, Tertre, Belgium. Sponsors: E. T. Bick, A. E. Raimo.

Charles H. Dickinson, Jr.—Supt. Charlottesville Woolen Mills, Inc., Charlottesville, Va. Sponsors: B. C. Bond, H. F. Hoffmann.

Jesse A. Fraser—Tech. Sales, Stein Hall & Co., Inc., Providence, R. I. Sponsors: F. G. La Piana, G. N. Houth.

Bernard C. Gallagher—Colorist, Crown Chemical Co., Ridgefield, N. J. Sponsors: A. E. Pinkney, P. H. Doremus.

Henry W. Geering—Mfg. Chemist, Ultra Chemical Co., Chicago, Ill. Sponsors: A. T. Brainerd, J. G. Stott.

Roy S. Highling—Foreman Dyer, Bradford Dyeing Association, Bradford, R. I. Sponsors: E. J. Chornyei, G. J. Curry.

Claude L. Jenkins—Text. Chemist, Peuchot Color & Chemical Co., New York, N. Y. Sponsors: R. H. Skinner, L. W. Hansen.

Frederick N. C. Jerauld, Jr.—Asst. to the President, Becco Sales Corp., Buffalo, N. Y. Sponsors: C. N. Rabold, D. S. Quern.

Emil A. Krahenbuhl—Director of Application Labs., Ciba, Ltd., Basle, Switzerland. Sponsors: R. C. Geering, E. Young.

Lucio Lucini—U. S. Repres., Montecatini Soc. Gen., Milano, Italy. Sponsors: C. J. Sala, P. J. Kennedy.

John R. Markgren—Office Mgr., W. C. Durfee Co., Inc., Boston, Mass. Sponsors: E. S. Chapin, W. S. Durfee.

Leonard S. Molendyke—Chemist & Asst. Dyer, Commercial Piece Dyeing Co., Paterson, N. J. Sponsors: L. Fusser, D. L. Clarenbach.

James M. Patton — President, Morningside Chemical Co., Chattanooga, Tenn. Sponsors: J. Anderson, R. W. Freeze.

Oscar L. Price—Foreman, Bleaching, Piece Dyeing, Eagle & Phenix Mills, Columbus, Ga. Sponsor: W. R. Jones.

Carroll B. Quaintance—Mgr., Stanalchem, Inc., New York, N. Y. Sponsors: S. M. Edelstein, A. W. Mack.

Fritz Raff—Tech. Chief, (Text. Chemist & Colorist) Ciba, Ltd., Medellin, Colombia. Sponsors: S. I. Parker, J. P. Bauer.

Steven Sopoci—Colorist, Calco Chemical Co., Bound Brook, N. J. Sponsors: R. Alvater, J. A. Orlando.

Feaster V. Tribble—Tech. Sales, Interchemical Corp., Textile Colors Div., Rock Hill, S. C. Sponsors: W. B. De Pass, E. R. Adair.

John A. Turner—Mgr., Chicago Office. Organic Chemicals Dept., E. I. du Pont de Nemours & Co., Inc. Sponsors: A. J. Feit, H. T. Latham.

Frederick D. Wallace—Mgr., Converting Div., Dominion Burlington Mills, Ltd., Montreal, Canada. Sponsors: R. W. Dedston, C. R. Teichgraber.

H. A. Webb—Salesman, General Dyestuff Corp., Chattanooga, Tenn. Sponsors: A. J. Nelson, R. E. Morris, Jr.

Robert Weiss — Chief Chemist, Draper Soap Co. Div. of Conti Prod. Corp., Pawtucket, R. I. Sponsors: E. A. Richards, J. E. Whetstone.

Stephen A. White—In charge of Lab., E. J. Feeley Co., Boston, Mass. Sponsors: E. S. Chapin, W. C. Durfee.

Raymond H. Williams—Chemist & Dyer, Consolidated Textile Co., Inc., Windsor Print Works Div., North Adams, Mass Sponsors: A. W. Craig, V. J. Barry.

ASSOCIATE

Charles S. Arms — Owner and U. S. Buyer, Daniel Arms Co., San Mateo, Calif.

John D. Haynes—Owner, John D. Haynes New York, N. Y.

John S. Kneale—Sales Engr., The Permutit Co., Chattanooga, Tenn.

T. Curtis McKenzie—Owner, Klem Chemical Works, Dearbon, Mich.

Elizabeth L. Reeves — Salesman, Frank Harley & Son, Boston, Mass.

Walter Stamm—Representative, Ciba Ltd., Basle, Bogota, Colombia.

George D. Stehlin—Export Sales Mgr., Stanalchem, Inc., New York, N. Y.

APPLICATION FOR TRANSFER TO SENIOR MEMBERSHIP

Miss Winifred N. Pardey.

STUDENT

Walter E. Flister—Lowell Textile Institute. Sponsor: E. E. Fickett.

Daniel T. Koshak—Lowell Textile Institute. Sponsor: E. E. Fickett.

Forrest B. Gardner, Jr.—North Carolina State College. Sponsor: A. H. Grimshaw.

Newell E. Rollins—North Carolina State College. Sponsor: A. H. Grimshaw.

Arthur A. Kuehn—Philadelphia Textile Institute. Sponsor: P. Theel.

Robert A. Dubreuil—Bradford Durfee Textile Institute. Sponsor: L. B. Coombs.

David D. Sanders—Bradford Durfee Textile Institute. Sponsor: L. B. Coombs.

Raymond E. Wishart—Bradford Durfee Textile Institute. Sponsor: L. B. Coombs.

•

CALENDAR

PHILADELPHIA SECTION
Meetings: September 26 (Kugler's, Philadelphia), November 8, January 16, 1948, February 27, 1948, April 9, 1948, May 21, 1948 (Bellevue-Stratford Hotel, Philadelphia).

NORTHERN NEW ENGLAND SECTION
Meetings: September 26, November 21.

SOUTH CENTRAL SECTION
Fall Outing, September 5th and 6th, (Lookout Mountain Hotel).

NATIONAL CONVENTION
October 23, 24, 25 (Congress Hotel, Chicago).

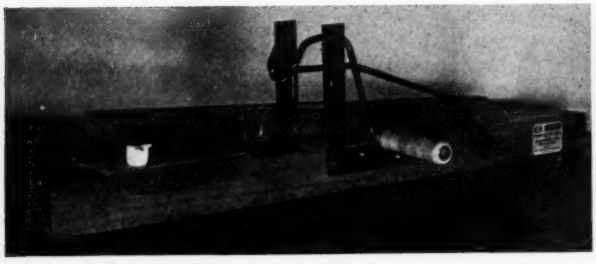
•

Local Sections are requested to notify the AMERICAN DYESTUFF REPORTER as soon as possible of their 1947-48 meeting dates

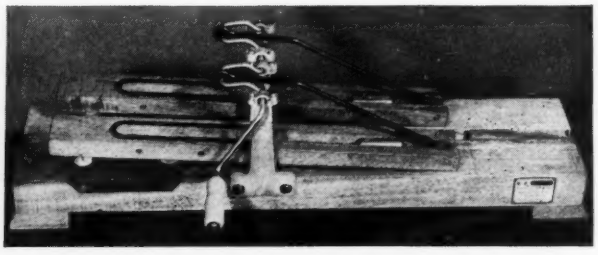
Crockmeters and Crockmeter Cloth

Revised Prices

Regular Crockmeter	$20.00
Regular Crockmeter (with automatic counter)	30.00
Duplex Crockmeter	50.00
Crockmeter Squares (500)	1.50
Crockmeter Cloth (96 x 100), by the yard	.75



Regular Crockmeter



Duplex Crockmeter

Executive Committee for Chicago Convention

GENERAL CHAIRMAN
Elmer F. Smith
American Aniline Products, Inc.
820 South Clinton Street,
Chicago 7, Illinois

DINING
Arthur T. Brainerd
Ciba Company, Inc.
325 West Huron Street
Chicago 10, Illinois

EXHIBITS
S. Klein
Calco Chemical Division
American Cyanamid Company
146 West Kinzie Street
Chicago 10, Illinois

FINANCE
Joseph H. Jones
Phoenix Dye Works
1963 Southport Avenue
Chicago 14, Illinois

HOTEL AND TRANSPORTATION
Eric Camp
National Aniline Division
Allied Chemical & Dye Corp.
357 West Erie Street
Chicago 10, Illinois

PUBLICITY
Elliott Morrill
Rit Products, Inc.
1401 West Jackson Blvd.
Chicago 7, Illinois

PRINTING
George B. Chabot, Jr.
Calco Chemical Division
American Cyanamid Company
146 West Kinzie Street
Chicago 10, Illinois

REGISTRATION AND RECEPTION
James Morrison
505 South Greenwood Avenue
Park Ridge, Illinois

TECHNICAL PROGRAM
Herman Boxser
Western Felt Works
4115 West Ogden Avenue
Chicago 23, Illinois

LADIES
Frank Meyers
Geigy Company, Inc.
629 West Washington Blvd.
Chicago 6, Illinois

ENTERTAINMENT
Norman Koehler
Phoenix Dye Works
1963 Southport Avenue
Chicago 14, Illinois

Purpose of the Chicago Convention

The Boston Convention commemorated the 25th Anniversary of the founding of our Association, rounding out an important era in the development of products and processes used in the textile industry. That quarter century also roughly coincided with that period in world affairs between the ends of the two World Wars.

With the exigencies of war now laid aside—we all hope, permanently—our industry faces a brilliant future of great development. What the next 25 years can bring in new textile fibers, dyeing and finishing improvements, would take a bolt prophesy.

Through the collective research which this Association affords, as well as through our individual efforts, we will have incentives to point out the directions our progress should take.

Therefore, the Mid-West Section cordially invites you to this Convention, hoping your attendance will profit you in suggesting ways for the improvements constantly being made and that you may again enjoy the benefits of good fellowship.

ABSTRACTS
FROM CONTEMPORARY JOURNALS

A Digest of Post-War Developments in Textile Processing

"Technologist", Textile Mercury and Argus, Supplement, page 71, March, 1947.

The processing of textile materials prior to dyeing, printing and finishing has, with the introduction of the newer synthetic fibers in the blends, become less drastic and consideration must be given to the action of alkalies, effect of temperature, and the effect of organic solvents on the synthetic fibers.

Soft water has become a necessity in the wet processing operations and in this regard progress has been made in the development of base-exchange substances.

Investigations and studies have led to greater knowledge in dyeing procedures for both the older natural fibers and the newer synthetic fibers.

Progress in finishing has been made with the availability of synthetic resins and polymers which impart permanent resistance to shrinkage and creasing. New processes for making wool goods unshrinkable have been discovered; however, the methods employing chlorine are the most widely used.

The Influence of Soap Hydrolysis on Detergent Action

K. Tomlinson, The Journal of the Society of Dyers and Colourists, page 107, Vol. 63, No. 4, April, 1947.

An investigation was made of the low detergent power of dilute soap solutions and the effect of adding sodium carbonate. Laboratory washes were used in the study and, although they do not necessarily represent a laundry procedure, valuable results were obtained which confirm that the hydrolysis of dilute soap solutions has a considerable effect on detergent power.

Light concentrations of soap solution were used on three soiled fabrics which varied in the amount of soiling. Results indicate that the region of concentration of maximum hydrolysis coincides with the region of concentration of minimum detergent power. The addition of sodium carbonate reduced the effect of hydrolysis and eliminated the region of minimum detergent power.

The test methods and materials used are described in detail and results are presented in both tabular and curve form.

Scouring Scotch Tweeds and Worsted Suitings

Textile Mercury and Argus, page 317, Vol. CXVI, No. 3022, March 7, 1947.

The scouring method for Scotch tweeds depends upon the amount and composition of the impurities and blending oil that are present in the cloth. When colors are subject to bleeding, less alkali and lower temperatures should be used. In the case of Scotch tweeds made from hank dyed yarns, the blending oil and most of the impurities have been removed and replaced with loose dyestuff particles and other dyeing chemicals. The scouring solution may then consist entirely of soap. Emulsification scours are usually more applicable to worsteds then saponification scours.

Methods and scouring formulas for both Scotch tweeds and worsteds are given.

Shortcomings of the Dyeing Industry as Seen by the Launderer, Dry Cleaner and Garment Dyer

S. C. Turner, The Journal of the Society of Dyers and Colourists, page 105, Vol. 63, No. 4, April, 1947.

Several examples are given illustrating difficulties encountered by the launderers, cleaners and garment dyers and showing the causes which are attributable to the dyeing trade. In most cases the mill dyers lack of knowledge regarding laundering and dry cleaning processes is the basis for unsatisfactory consumer cleaning. The textile industry should think of the future of its products and by cooperative pooling of knowledge prevent the occurrence of poor results in dry cleaning and laundering.

Copies of Journals Abstracted will be loaned on request

Some Biological and Chemical Properties of Animal Hair

J. L. Stoves, The Journal of the Society of Dyers and Colourists, page 65, Vol. 63, No. 3, March, 1947.

Hair, which is a characteristic mammalian structure and a number of the keratin group of scleroproteins, often acts as a heat regulator, a tactile organ, and as a protective agent against the environment. The biological and chemical characteristics in the pigmentation of hair is discussed. The structure of hair is reviewed including results obtained through miscroscopic, electron-micrograph and X-ray examination. Photomicrographs are given and methods for microscopic examinations of fiber sections and their application are described. The various types of linkages formed as well as other chemical actions caused by alkalies, oxidizing agents, formaldehyde, quinones and enzymes on keratin are considered. The axial contraction of a variety of keratin fibers in sodium metabisulfite, thioglycollic acid, formic acid, chlorine water, cuprammonium hydroxide, urea and m-cresol under different conditions was studied.

The Accuracy of Colorimetric Instruments in Dye Strength Determinations

O. L. Davies, C. H. Giles and T. Vickerstaff, The Journal of the Society of Dyers and Colourists, page 80, Vol. 63, No. 3, March, 1947.

The relative accuracy of the photoelectric absorptiometer, the Duboscq type colorimeter, and the visual spectrophotometer was investigated. Dye strength determinations were made with the three instruments by six observers each using five acid dyes in four strengths of solution. Results indicate that the photoelectric absorptiometer is the most accurate with the Duboscq type colorimeter giving the least consistent results. It is noted that the photoelectric absorptiometer is independent of the previous experience in color matching of the observer. A statistical analysis of the entire study is included in several tables.

• PATENT DIGEST •

Starch Size, containing hexamethylene tetramine — A, 4, 01

U. S. Pat. 2,417,515 (Neumann, March 18, 1947; applic. Nov. 6, 1940)

A colloidal soluble starch which might be used for sizing, thickening or finishing purposes is prepared by heating a starch slurry with a condensate of sodium acetate and hexamethylene tetramine to which carbolic acid (phenol) is added as a disinfectant. It is disclosed that by heating this slurry (5 g. starch, 0.5 g. of the above condensate in 100 g. water) over an open flame, no lumps whatsoever are formed. The liquid remained thin even at the normal congealing temperature (168° F.). At the boil the solution does not thin out but becomes gradually more viscous and after cooling the mass does no more solidify. It can be assumed that starch undergoes a substantial chemical change the nature of which is not explained in the specification.

References: The phenomenon is the more surprising as urea-formaldehyde condensates were generally used for hardening and insolubilizing starch films. Numerous patents could be quoted here, for instance. U. S. Pat. 2,385,714 (Stein Hall): starch finishes are mixed with urea-formaldehyde condensates for insolubilizing them; U. S. Pat. 2,385,438 (Chemic. Developm.): mixtures of starch—urea formaldehyde—silicates for sizing; U. S. Pat. 2,302,309 (Rohm & Haas): permanent finishes, produced with starch and urea formaldehyde and so on.

Sizing Agents—Polyvinyl-alcohols — A, 4, 01

U .S. P. 2,413,789 (du Pont, Scheiderbauer, Jan. 7, 1947; applic. June 18, 1943)

Polyvinyl alcohols give odorless, tasteless, transparent and non deteriorating films. They might be very useful for preparing sizes and finishes but for their sensibility of water. Polyvinyl alcohol dissolves in hot water and it is highly swollen in cool water. It is the purpose of the present patent which aims at the manufacture of shaped articles—but can as well be used for finishing and the like purposes—to change the properties of polyvinyl alcohol, making it less sensitive to water. This is accomplished by heating the substance in the presence of air and a strong base. Any water soluble base, also a quaternary ammonium base can be used. The concentrations are 15% by weight and more at temperature between 50 and 90° C. It has to be considered that the fastness to water subsists only at temperatures below 50°. Thus this treatment may also be useful for sizing yarns while desizing could be carried out in warm water.

References: Polyvinyl alcohol sizes aftreated with formaldehyde: Brit. P. 431,524 and 431,703-04 (I.G.). Mixtures of polyvinyl alcohols of different viscosities described in former du Pont patents (for instance N. S. P. 1,998,544) as sizing agents. Brit. P. 413,264 (I.G.): polyvinyl sizes, made more viscous by adding borax or other boron compounds.

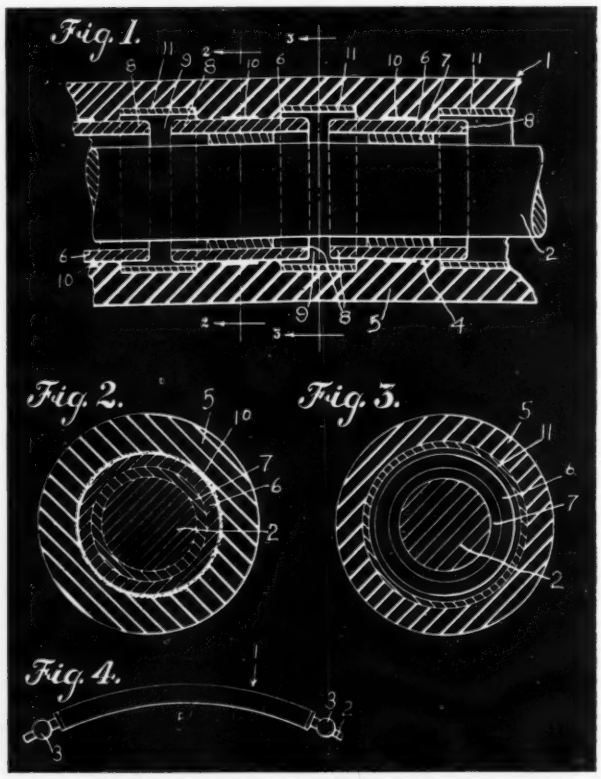
PAUL WENGRAF

Cloth Expanding Roll — G, 3

U. S. Pat. 2,415,864 (Birch, February 18, 1947, application, August 20, 1945)

The invention relates to curved rods, used as expanders. Generally these expanders are placed before the entrance of tenter frames, calenders or drying drums. They are usually made from a curved rod on which are mounted a plurality of roll sections freely turning around the rod. The present invention relates to some improvements for instance in the way the roll sections are anchored to an outer rubber covering of the rod. Fig. 1 of the accompanying drawing gives a longitudinal section of the rod (2). Fig. 4 is a view of the whole expander roll. Fig. 2 and 3 are cross sections. The principal feature of this patent has to be seen therein that a bearing sleeve (7), rotating freely about the supporting rod (2) forms the inner part of one of the roll sections (4). These roll sections are covered with the outer covering (5) to which they are *attached centrally* at (10), for instance by vulcanization, but *not at the ends of each roll.* Thereby an increased flexibility of the device results.

Cloth Expanding Roll



Fumeproofing — Acetate of cellulose — Substituted diamines used C, 4, 07

U. S. Pat. 2,416,380
(Imp. Chem. Ind., Collie-Giles-Wilkinson, February 25, 1947, application, June 25, 1943, Brit. Prior, July 18, 1942)

It is well known that dyed materials, consisting of acetate of cellulose are often discolored by the action of gas fumes. Especially blue and violet shades frequently show this lack of fastness. Several nitrogen containing bodies have been proposed for preventing this drawback. The present invention proposed to use substituted diamines, for instance diphenyl ethylene diamine. These diamines are not water soluble; they have to be added to the dyebath in form of a dispersion. A preferred dispersing agent is, according to this specification, disodiumdinaphthylmethane-disulfonate. When the water soluble salts of these diamines are used it is necessary to liberate the free base in a special operation, for instance by an alkaline soaping treatment because the salts themselves have no fumeproofing effect.

References, cited by the Patent Office are amongst others.

U. S. Pat. 1,930,232, 1933 (Celanese): substituted aminodiphenylmethanes for improving generally the fastness to acids and light.

U. S. Pat. 1,957,493, 1934 (Celanese): unsymmetric substituted diamines (type of sapamines) for aftertreating acetate of cellulose.

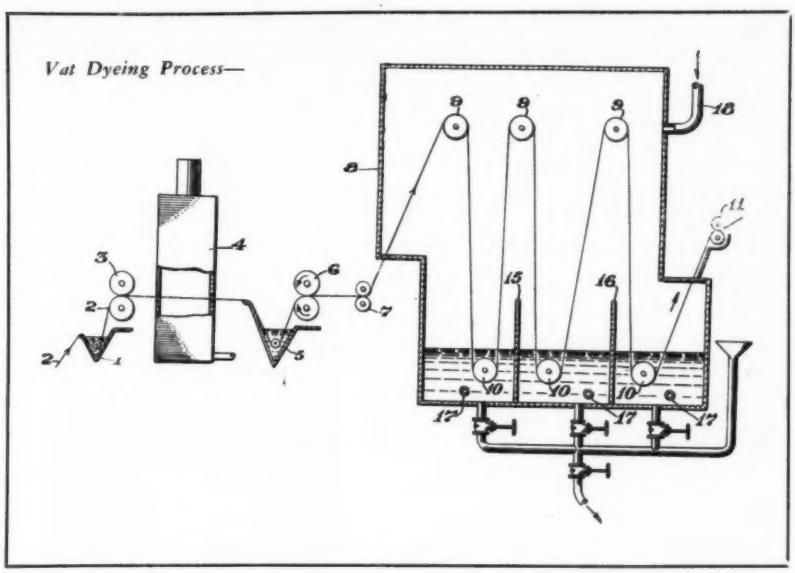
U. S. P. 2,298,401, 1942 (Eastman Kodak): hydroxy alkyl ethylene diamine for aftertreating acetate of cellulose.

For other references see the abstract in AMERICAN DYESTUFF REPORTER 1947, p. 17 to U. S. Pat. 2,403,019.

Vat Dyeing Process — Apparatus for pad steaming C, 6

U. S. Pat. 2,415,379
(du Pont, Vieira, February 4, 1947, application, March 11, 1944)

Dyeing with reduced vats is generally carried out by batch processes as described for instance in U. S. Pat. 2,318,133 (Werntz). Pad dyeing with reduced vat solutions has often the drawback of giving uneven shades by the fact that some leucocompounds are not sufficiently soluble while weak or pastel shades, produced by this process show the tendency of the color to migrate on the goods because of the relatively large amount of liquids. The pigment pad dye method working with emulsified, non-reduced dyestuffs, permits the application of baths in any desired strength but it has on the other hand the drawback of requiring very much handling in the reducing bath aftertreatment. In this phase there can also



happen some objectionable surface oxidation. The present invention solves the problem of continuously padding the non-reduced dyestuff and of subsequently developing the dye in a continuous operation without risking any surface oxidation. The principle of this invention may best be understood by consulting the drawing. The goods are padded in a vat dyestuff dispersion, squeezed out with 50% moisture retention and passed through a hotflue (4) to the "chemical pad" (5) where they are impregnated with 1.5 oz. of caustic and 4 oz. hydrosulfite per gallon at 70° F. This low temperature is important because reduction of the vat dyestuff has to be practically avoided in this part of the apparatus. The textiles are again squeezed out and enter the chamber (8), filled with steam, coming from (18). They pass alternatively the steam filled upper part of the chamber (8) and a new quantity of developing solution (caustic plus hydrosulfite) under practically complete absence of air. The fabrics are then squeezed out at (11) and re-oxidized and soaped in the usual way. The innovation over former processes is that the *fabrics contain already the necessary ingredients* in a non-reacted state before entering the developing chamber and that the development takes place thereupon suddenly and completely.

References cited by the Patent Office are amongst others:

U. S. Pat. 2,204,839 and 2,151,363 (Duo Dyeing Machine Co.) describing two separate tanks, arrayed side by side with two squeezing rolls, located above and between these tanks. One of the tanks is for instance suitable for impregnating, the other one for developing in vat dyeing processes.

U. S. Pat. 2,164,930 (du Pont): the process is characterized by padding with non vatted compositions of vats and formamidine sulfinic acid, then by leading the fabrics through a heated caustic solution.

The Pad-Steam process, corresponding to the present invention and covered, as far as the equipment is concerned, by this patent has been fully described by Meunier in AMERICAN DYESTUFF REPORTER, 1945, p. P106, also in *Rayon Textile Monthly,* 1946, 90 (316). The idea of applying vat dyestuff dispersions in one step and reducing the dyes in another separate operation, thus being a precursor of the present Pad-Steam process, has already been described in 1908 in an old U. S. Pat. 893,384 by Schlegel.

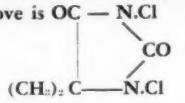
Shrinkproofing Wool — Hydantoins A, 2, 04

U. S. Pat. 2,414,704
(du Pont, M. L. Ward, Jan. 21, 1947, application Oct. 25, 1944)

It is well known that halogenating processes render wool shrinkproof. Free halogen as well as halogenated organic compounds or N-chloramides have been proposed for this treatment. Serious disadvantages are said to be encountered here such as a harsh hand and a reduced tensile strength. In a continuous operation irregular results occur: the first part of the fabrics is overtreated and the end has not sufficiently reacted with the shrinkproofing agent. According to the present invention a wool containing textile material is immersed in a dilute solution of an N- chlorohydantoin and a strongly acidic buffer. Wool flannel is for example immersed in a 0.15% solution of 1-3- dichloro- 5-5 dimethyl hydantoin, dissolved in a dilute acid sodium

sulfate solution (pH= 1.5) at 158° F. After 20 min. the fabric is removed, wrung out and rinsed with bisulfite. It was surprising to note that the shrinking tendency had remarkably decreased by this treatment in strongly acid buffered solutions without any discoloration, tendering or hardening of the fibers.

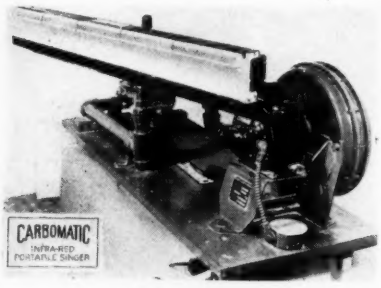
Remark: Hydantoin is a urea- derivative. The formula of the product mentioned above is



TRADE NOTES • NEW PRODUCTS

• Portable Infra-Red Singeing Unit

Carbomatic Corporation, manufacturers, 24-81 47th Street, Astoria, L. I., New York, have added a new portable model to their line of gas-fired infra-red singeing units. Mounted on a movable platform, the unit can be shifted from place to place and adjusted to any position or heat focus. Such mobility often is said to effect a production time-saving, either when the unit is employed separately or as an adjunct to a permanently-fixed battery of infra-red ingeing units. This portable unit also can be utilized wherever additional drying is necessary in a textile mill. It is said to be particularly well adapted for handling blankets, heavy cloths, rugs, etc.



Portable Singeing Unit

A self-contained unit, complete with blower, gas-air mixer and controls, this new portable singer may be specified in various sizes of refractory (invariably made with the Carbomatic one-piece reflector surface, uninterrupted and unbroken by housing support or fixtures).

• Prevention of Deterioration Abstracts

The National Research Council of the National Academy of Sciences, (Prevention of Deterioration Center, Room 204), 2101 Constitution Avenue, Washington, D. C., can now offer the "Prevention of Deterioration Abstracts" on a yearly subscription basis. These Abstracts are set up under the following headings: Electrical and electronic equipment; Finished assemblies; Fungicides; Lacquers, paints, and varnishes; Leather; Lubricants; Metals; Microorganisms; Optical instruments; Packaging; Paper; Plastics; Resins, rubbers, and waxes; Storage; Textiles; and Wood. Items abstracted include journal articles, patents, specifications, unpublished reports prepared by various Army, Navy, and other governmental groups, and unpublished British, Australian, and Canadian reports.

There will be approximately 1500 pages of the Abstracts per year. The individual Abstracts are in loose leaf form, so that they may be arranged in manner desired by the individual receiving them. Throughout the calendar year, all the Abstracts classified under any one heading will be numbered consecutively.

Comments made by the personnel of the Prevention of Deterioration Center are added to many of these Abstracts. In these comments attempts are made to relate a specific report with other relevant ones, to evaluate reports, or to make suggestions concerning further needed research.

The price, which includes two binders and index guides, will be $37.50 per year. Two binders are required for one year's subscription. The fiscal year will be from July 1st to June 30th. For the year 1946, back issues will be supplied since these Abstracts started in April 1946.

• Purchasing Agent, Hooker Electrochemical Co.

Horace W. Hooker, Jr., who has been appointed as purchasing agent for the Hooker Electrochemical Co., Niagara Falls, N. Y. Mr. Hooker, a graduate of Cornell University, has been associated with the company since 1934. For the past six years he has been assistant purchasing agent. Prior to that he had been engaged successively in the Research and Development Department, in the development of Virgo Salt used in a process for cleaning stainless steel, and had been assistant to the sales manager in charge of Sales Promotion and Advertising.

• Appointed General Manager

William J. Durocher, manager of the Arnold Print Works, Inc., at Adams, Mass., since its acquisition in 1942 by the Aspinook Corporation, has been appointed general manager of both the Arnold Print Works and the Hampton Print Works Division at Easthampton, it was announced recently by William A. Broadfoot, president of Aspinook.

The Hampton Print Works, acquired by Aspinook last year, specializes in the production of printed high quality, highly-styled cotton dress goods and was founded in 1916 by the late Thomas McConnell.

Working under Mr. Durocher, William Guinan will continue to serve as manager of the Hampton Print Works.

Mr. Durocher, who had been manager of the Adams plant since 1932 when it was known as the Jones Division of the Arnold Print Works, will continue to make his headquarters in Adams.

Other personnel changes at the Arnold Print Works are:

Irving C. Ruhman, former assistant manager, becomes acting head; Harold B. Grange, former chief colorist and superintendent of printing, is now plant superintendent and J. Haines Spencer becomes chief colorist and superintendent of printing.

• Ninth Annual Meeting, I.R.I.

At the ninth annual meeting of Industrial Research Institute on June 5 and 6 in Swampscott, Mass., N. A. Shepard, chemical director of American Cyanamid Co., was elected president and E. W. Engstrom, vice-president in charge of Research of the RCA Laboratories, vice-president for the ensuing year. C. L. Bausch, vice-president of Bausch & Lomb Optical Co., and P. D. V. Manning, vice-

president in charge of Research of International Minerals & Chemical Corp., were elected to three-year terms on the Board of Directors.

The second presentation of the Industrial Research Institute Medal was made to Charles Allen Thomas, executive vice-president, Monsanto Chemical Company, for his pioneering and inspiring leadership in the development of the American industrial research system and for his participation thus in American chemical enterprise. In accepting the award Dr. Thomas warned that America can no longer look to scientists of other nations for basic scientific achievements but must stimulate the originality and creativeness of its own research to new and greater heights if the country's security in an atomic era is to be insured.

Karl T. Compton, president, Massachusetts Institute of Technology, Cambridge, Mass., addressed the Institute on the subject of tilling the soil for the industrial research crop. He gave examples to show that a long period of fundamental research preparation must precede most important developments. Our war experience, however, said Dr. Compton, has demonstrated the possibility of shortening this period in the case of problems of great magnitude, such as atomic energy and cancer research, by the application of group effort and financial support on a large scale plus topnotch leadership.

Other features of the meeting, which was attended by one hundred and fifty member company executives and their guests, were two panel discussions. One on what has been done or might be done to develop better methods of selecting industrial research workers was led by four industrial psychologists. The other panel, made up of management consultants, presented its views on the function and place of research in an industrial organization, effective management techniques, the trend toward increasing responsibility for the research executive in shaping company management policy, etc. The meeting was concluded by an inspection tour of the research laboratories of Massachusetts Institute of Technology.

The Industrial Research Institute is a non-profit organization for the promotion of improved management in industrial research and is composed of 90 member companies from various industrial fields.

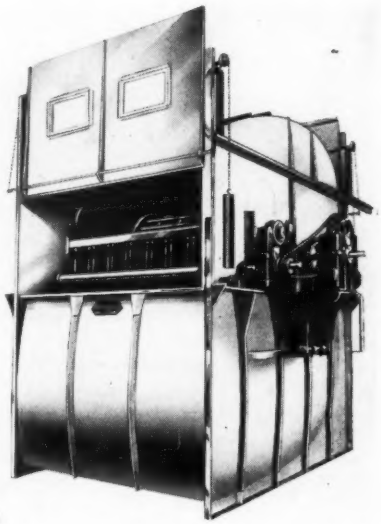
• Combination Washer and Dye Kettle

The Rodney Hunt Machine Co., 47 Mill St., Orange, Mass., has announced a new combination washer and dye kettle of all stainless steel construction. This machine is said to have all of the features and advantages of the most modern dye kettle, together with the latest developments in washer construction, combined in one machine.

It is claimed that this Rodney Hunt combination washer and dye kettle is specially advantageous in plants handling light weight woolen and worsted fancies and blends. The scouring operation is said to be particularly enhanced by the all stainless steel construction of this machine.

The manufacturers state that a considerable saving in time and labor is acquired because the scouring, washing and dyeing operations can be performed without removing the goods from the machine.

It is also said that the Wring-Master Pneumatic Controls on the squeeze rolls assure exact regulation and permit maximum pressure for most effective washing, with no damage to the finest goods.



Combination Washer and Dye Kettle

• Retires from duPont

Dr. Ernest B. Benger, one of the country's outstanding research directors and an authority on synthetic fibers and films, who retired from the Du Pont Company on June 25th, the 30th anniversary of his employment with the company as a research chemist.

Dr. Benger was manager of the Rayon Technical Division, which has extensive research laboratories at the Du Pont Experimental Station in Wilmington and at Buffalo, N. Y.; Richmond and Waynesboro, Va. He elected to retire at the age of 61, some four years prior to the Du Pont Company's retirement age. He will be succeeded by Andrew E. Buchanan, Jr., assistant manager of the Rayon Technical Division since 1944.

• Warwick Chemical Appointments

Ernest Nathan, President of Warwick Chemical Company, division of Sun Chemical Corporation, announces the appointments of Albert Leitstein as General Manager and Harold Callen as Sales Manager of the featured fabric finishes Department of Warwick Chemical Co.,

Albert Leitstein

Harold Callen

which includes Impregnole, the renewable water repellent, Norane, the durable water repellent, and Durlana, wool shrinkage process and compound. Both Mr. Leitstein and Mr. Callen bring to their new offices wide experiences in the textile and textile chemical fields.

• Nourathar

"Nourathar—The Fine Art of Light-Color Playing" is the title of a book by Mary Hallock Greenwalt covering this new means of fine art expression. Contents of the book are described as follows: *Part 1*—Quasi-introductory and explains auditorium arrangements called for in light-color play; *Part 2*—The instrument for light-color playing; *Part 3*—The playing; *Part 4*—Workable instructions for recording light-color sequences for future re-playing; *Part 5*—Technique for light-color play; *Part 6*—Actual examples of composing in light.

"Nourathar" is the author's coined name for the Sixth Art. The word is derived from the Arabic roots "nour" meaning light, and "athar", the essence of.

The book consists of 450 pages, including 150 illustrations. Dye specialists and colorists will be interested in the author's definite measure for color, color shade and color tint. Copies may be obtained at $15.00 each from the author, Hotel duPont, Wilmington 99, Delaware.

• Elected President, Printers and Dyers Association

Thomas F. O'Brien of R. W. Bates Piece Dye Works has been elected President of the Silk & Rayon Printers and Dyers Association. Mr. O'Brien is well known to REPORTER readers having served previously as chairman of the membership committee of the New York Section of the AATCC and is at present a councilor representing that section. Joseph Seyer, Sr. of Seyer Silk Dyeing and Finishing Company, former president, has been elected chairman of the board.

Other officers elected were: Fred Kern, F. P. Maupai Dyeing Co. and Dean Lewis, Colonial Piece Dye Works, *Vice-Presidents:* William Peltzer, Puritan Piece Dye Works, *Treasurer;* James L. Meltzer, Antipyros Co., *Corporate Secretary.* Howard J. Fletcher was re-appointed secretary.

As a result of the election of directors the board now includes the following: A. E. Collins, Empire Piece Dyeing & Finishing Co.; Felix Tagliabue, Palisade Piece Dye Works; Edward J. Bass, J. Bass & Co.; Alfred Bohny, Modern Central Dyeing & Finishing Co.; George F. Gaede, Fair Lawn Finishing Co.; Charles Greischel, Bouchard & Charvet Dyeing & Finishing, Inc.; Walter Harand, Dundee Finishing Co.; John Hoffman, Pyramid Piece Dye Works; George Nicely, Fontaine Converting Works, Inc.; Alphonse Van Houten, Cliffside Dyeing Corp.

• Joins ITT

Dr. William H. Horne, who has joined the staff of the Institute of Textile Technology to work in the Division of Organic Chemistry. He comes to the Institute after 14 years with the Kenwood Mills of F. C. Huyck and Sons, where he was in charge of the laboratory and engaged in research on the chemistry of wool and wool processing.

• National Aniline Exhibit at Textile Exposition

Shown above is the exhibit of the National Aniline Division of Allied Chemical and Dye Corporation at the International Exposition of Textiles held at Grand Central Palace the first half of June.

The exhibit attracted considerable attention due to the effect of a moving screen created by dissolving 3 ounces of Nacconol NR in 52 gallons of water and forming a waterfall effect with the resulting suds. An area of about 5 feet by 12 feet was covered with the suds. With one charge of Nacconol NR the display can be kept in operation about 5 days, depending upon the amount of dust and dirt in the air.

Many unusual variations may be obtained by the use of colored suds, colored lights and moving figures behind the screen. There are also possibilities in the use of fluorescent dyes and ultra violet light.

In addition to the interest of textile men, people concerned with store and theatrical displays also gave the exhibit considerable attention.

• Aldo Chemical Corp.

Announcement has been made of the formation of the Aldo Chemical Corporation, 33 Union Square, New York 3, N. Y. This firm will engage in the manufacture and sale of fine and rare chemicals for industrial and research use.

• Catalog Available

A catalog of translations of patent applications for processes and machinery developed by I. G. Farben, Germany, is available from Research Information Service, 509 Fifth Avenue, New York 17, N. Y. Subjects covered include the following: Synthetic Fiber Production, Plastics —Raw Materials, Processing of Fibers and Plastics, Plastics — Manufacturing Processes and Machinery for Rayon Production and Spinning. This firm also offers an individual translation service on scientific German documents for firms desiring such translations for their private use.

• Booklet on Solvent Recovery

A new and completely revised edition of the booklet, "Solvent Recovery by the 'Columbia' Activated Carbon System", has just been published by Carbide and Carbon Chemicals Corporation, a Unit of Union Carbide and Carbon Corporation. This 36-page booklet contains complete information on solvent recovery and other

applications of activated carbon. Detailed explanations of how solvent recovery systems work, what equipment is used, the costs of operation, and recommended industrial applications are included. Copies may be obtained without charge by writing to Carbide and Carbon Chemicals Corporation, 30 East 42nd Street, New York 17, N. Y.

• Named Fabric Development Manager

Carl I. Taber has been named manager of the newly formed fabric development section of the Nylon Division, it was announced recently by Warren A. Beh, director of sales of the Nylon Division of E. I. du Pont de Nemours and Company.

Mr. Taber, who has been connected with the textile industry since he was graduated from Brown University in 1922, is a past president and member of the board of governors of the American Association of Textile Technologists.

• Join National Adhesives

Richard E. Harren, of Astoria, N. Y., has joined the Resyn department of National Adhesives, New York City, as a chemist. He is a graduate of Queens College, with post-graduate work in chemistry at Columbia University. Mr. Harren was a navigator in the AAF where he served for three years during World War II.

Another new member of the Resyn department is Paul H. McCormack of Brooklyn, laboratory assistant, whose work will be in physical testing. Mr. McCormack is an alumnus of Brooklyn Polytechnic Institute, where he majored in chemical engineering. He is also a veteran, with three years' service in the Army.

• Receives Netherlands Decoration

Andre L. Picard, vice-president of Stein, Hall & Company, Inc., has been decorated by Queen Wilhelmina of the Netherlands with the order of Oranje Nassau for his services during and after the second World War.

In addition to his position with Stein, Hall & Company, Inc., Mr. Picard has for many years been a director and a vice-president of the Netherlands Chamber of Commerce in New York.

• Joins U. S. Rubber

W. O. Jelleme has joined the textile division of United States Rubber Company as assistant manager of new products. A. E. Jury is manager of the department.

Mr. Jelleme is widely known in the textile industry. He brings to his new association many years' experience with Pacific Mills in the development, merchandising and distribution of textiles. He also has been associated with Cohn-Hall-Mark and Brighton Mills.

Mr. Jelleme's headquarters will be at the rubber company's general offices, 1230 Avenue of the Americas, New York.

• Appointed Manager of Fabrics Division

J. Warren Kinsman, general manager of the Fabrics and Finishes Department of the Du Pont Company, announced recently the appointment of James R. Buckley as manager of the Fabrics Division, to fill the vacancy caused by the death of M. J. Callahan. Mr. Buckley had been assistant manager of the division since November 5, 1945.

Max N. Nickowitz, who had been director of sales of the Fabrics Division, was appointed assistant manager. The headquarters of the division are in New York City.

OBITUARY

MICHAEL J. CALLAHAN

MICHAEL JOSEPH CALLAHAN, manager of the Fabrics Division of the Fabrics and Finishes Department of the Du Pont Company, died unexpectedly in Wilmington on June 25 at the age of 57. He had been with the Du Pont Company 31 years. He is survived by his wife, two daughters and a son.

Mr. Callahan was born at Whitinsville, Mass., on December 12, 1889, and was graduated from Worcester Polytechnic Institute in 1911. He joined the Du Pont Company in 1916. In 1932 Mr. Callahan became chemical director of the Fabrics and Finishes Department, and in 1936 was made assistant to the general manager. In 1941 he was appointed manager of the Fabrics Division, the position he held at the time of his death. In that capacity he had offices in both Wilmington and New York. His first position was at the Parlin, N. J., plant, where he was a research chemist. In 1921-1922 he was engaged in film research at the Redpath Laboratory, also in Parlin. From 1922 to 1932 he was chemical superintendent of the Parlin plant. It was in that period that "Duco" nitrocellulose lacquer was developed.

Degradation of Cotton Fabrics—

(Continued from Page 410)

The gray fabrics ranged from about 39 percent loss for the spring months to 48 percent for the late summer, while the purified fabrics ranged from about 51 percent to 60 percent for the same periods. The differences between these losses for the two types of fabrics demonstrate the generally greater resistance of the gray fabrics to the composite effects of weathering. The fluidity values for the osnaburg did not show as marked an effect, the average fluidity being approximately 12.5 rhes from January through April and about 14.5 rhes from May through December.

Summary

Changes in breaking strength and fluidity were employed as the chief criteria of the degradation suffered by cotton fabrics during exposure to weather in the subtropical climate of New Orleans. By combining data secured from replicate samples, exposed for equal periods of time but under different seasonal conditions, it was possible to determine the average or year-round effects of weather on untreated cotton fabrics of different weights and constructions.

It was shown that an unbleached 10-ounce cotton duck, for example, may be expected to lose on the average about 40 to 45 percent of its original warp breaking strength after 6 months of exposure, and from 60 to 65 percent after 12 months of exposure. These losses are accompanied by fluidity increases up to about 16 and 22 rhes, respectively. Unbleached lighter-weight fabrics show somewhat greater strength losses with about the same fluidity increases. Kierboiled or bleached cloth suffers slightly greater average strength losses than gray cloth of equal weight, and its degradation is characterized by definitely higher fluidity values at points of equal strength loss.

Wide variations in breaking strength losses were observed in replicate gray samples exposed during different seasons of the year. These variations were attributed chiefly to biological attack, since they were accompanied by only minor fluidity changes, and since it has been

demonstrated that when cotton cloth is degraded by biological action the surviving material shows very slight increase in fluidity. Kierboiled cloth was much less subject to biological attack, and its strength losses, believed to be due chiefly to the photochemical action of sunlight, were somewhat less influenced by seasonal variations and were accompanied by relatively high fluidity values.

Acknowledgment

Appreciation of their assistance in securing the data presented in this paper is expressed to Dr. H. D. Barker and Dr. P. B. Marsh, Bureau of Plant Industry, Soils, and Agricultural Engineering, who made the pure culture tests; to Dr. C. M. Conrad and associates of the Cotton Fiber Research Division, Southern Regional Research Laboratory, for a large part of the fluidity measurements; and to numerous members of the Cotton Chemical Finishing Division of this Laboratory, who carried out all the other physical and chemical tests.

References

(1) Searle, G. O. The rotting of textiles by microorganisms. I. A laboratory test. J. Textile Inst. *20*, T162-74 (1929).

(2) Thaysen, A. C., Bunker, H. J., Butlin, K. R., and Williams, L. H. The effect of climatic exposure on textile fibers and fabrics. Ann. Applied Biol. *26*, 750-81 (1939).

(3) Grimes, M. A. The effect of sunlight and other factors on the strength and color of cotton fabrics. Texas Agr. Expt. Sta. Bull. No. 474. 56 pp. February 1933.

Grimes, M. A. Further studies of the effect of sunlight on the strength and color of cotton fabrics. Texas Agr. Expt. Sta. Bull. No. 506. 42 pp. May 1935.

(4) U. S. Weather Bureau, New Orleans, La. Annual meteorological summary with comparative data. 1942-1946 inclusive.

(5) Am. Chem. Soc., Committee on Viscosity of Cellulose, Div. of Cellulose Chemistry. A standard method for determining the viscosity of cellulose in cuprammonium hydroxide. Ind. Eng. Chem., Anal. Ed. *1*, 49-51 (1929).

(6) Conrad, C. M. Cotton quality determination by application of certain chemical methods. Textile Research *7*, 165-74 (1937).

(7) Conrad, C. M. Role of velocity gradient in determining the cuprammonium fluidity of cellulose. Ind. Eng. Chem. *13*, 526-33 (1941).

Conrad, C. M. and Tripp, V. W. Convenient adjustment to a standard velocity gradient of the fluidity of anomalous cuprammonium solutions of cellulose. Textile Research J. *16*, 275-83 (946).

(8) Clibbens, D. A. and Ridge, B. P. The tensile strength and fluidity of chemically modified cotton. J. Textile Inst. *19*, T389-404 (1928).

Solubilization—

(Concluded from Page 412)

as phenols and cresols greatly increase the amounts of water taken up by the detergent solution.

Soaps containing small quantities of water can be made to dissolve or emulsify in organic solvents and by this means the cleansing powers of the solvents used in dry cleaning, for example, may be increased. Special soaps are usually made which are incompletely saponified (superfatted) and may also contain added alcohol, esters, etc. These are known as dry cleaning soaps. The water held in the soap micelles (Figs. 3 and 4) formed in dry cleaning solutions has solvent properties for certain kinds of soil and aids in its removal. At the same time this added water reduces the danger of the production of electrostatic charges in the hydrocarbon through friction.

Dry cleaning soaps which are soluble in dry cleaning solvent but not in water can be prepared from incompletely saponified fats or oils with added triethanolamine, chloroform, amyl acetate, benzene, etc. These soaps are brushed on the fabric after having been mixed with a small quantity of water. When most of the added water has evaporated, the garment is dry cleaned.

Dry-wet soaps are soluble in either water or dry cleaning solvents. These soaps might contain monopole oil (sulfated castor oil) instead of incompletely saponified fats or oils. They are added directly to the dry cleaning solvent.

The following stains are commonly removed by either of the above types of soaps: tar, carbon, heavy grease, blood, perspiration, water spots, sizing marks, imbedded dirt, grass stains, all proteins (eggs, etc), and hem marks.

References

1. Bailey, C. R., J. Chem. Soc., London *123*, 2579 (1923).
2. Creely, J. W. and LeCompte, G. C., Am. Dyestuff Rept., *28*, 627 (1939).
3. Harkins, W. D., Mattoon, R. W. and Corrin, M. L., J. Am. Chem. Soc., *68*, 220 (1946).
4. Kraemer, E. O., "Advances in Colloid Science," Vol. I (1942) p. 99-142, Interscience Publishers, N. Y.
5. McBain, J. W., Merrill, R. C. Jr. and Vinograd, J. R., J. Am. Chem. Soc., *62*, 2880 (1940).
6. McBain, J. W. and Richards, P. H., Ind. Eng. Chem., *38*, 642 (1946).
7. Pink, R. C., J. Chem. Soc., London, 53 (1939).
8. Smith, E. L., Analyst *56*, 9 (1931).
9. Smith, E. L., J. Phys. Chem. *36*, 1401 (1932).

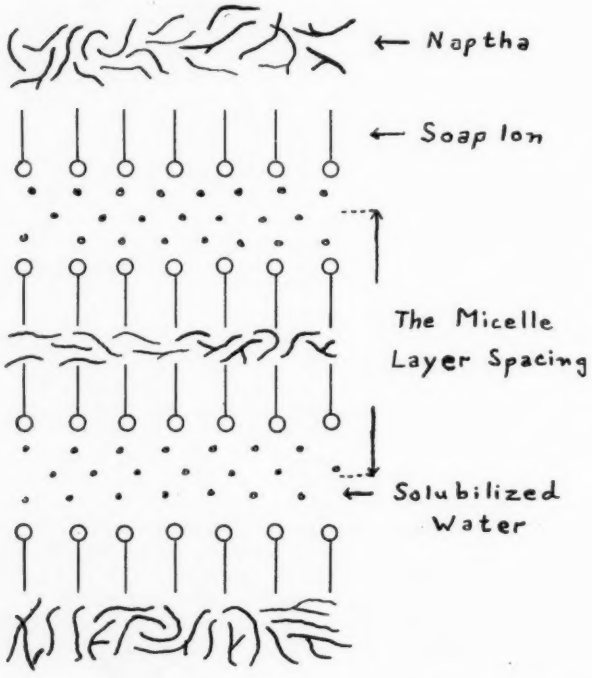


Fig. 3 (←) — Cross Section of a Soap Micelle in Naptha.

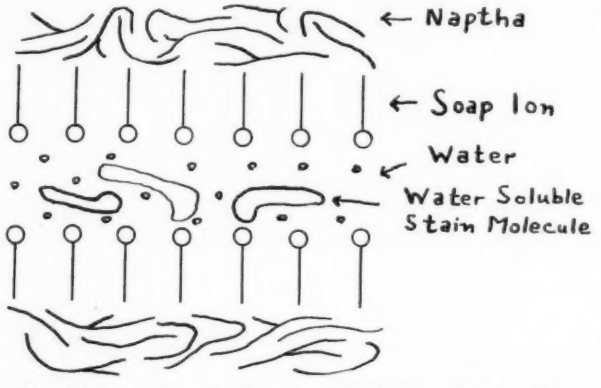


Fig. 4 (↑) — Cross Section of a Micelle Layer Spacing Naptha Containing a Stain Solubilized in the Water Layer.

"WAPACO" PRODUCTS
Serve the Textile Industry

DYESTUFFS
CHEMICALS
TEXTILE SOAPS
TEXTILE OILS
STRIPPING COMPOUNDS

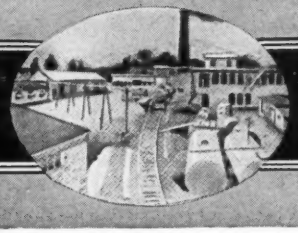
Liquid
HYDRALDEHYDE
THE NAME TO REMEMBER WHEN BUYING STRIPPING AGENTS

•

Outselling all others since its origin twenty years ago—it is *today* the woolen industry's *safe* stripper. Our constant efforts to eliminate free zinc in *liquid* HYDRALDEHYDE through modern manufacturing methods assure stronger fibres in reworked wool and piece goods.

Test *liquid* HYDRALDEHYDE against any other stripping agent offered—either powder or liquid— for a true comparison of the fibre's breaking strength.

•



WATSON-PARK COMPANY
261 FRANKLIN STREET • BOSTON, MASS.

FOR FAST PENETRATION
And to assure a
BETTER HAND—
Use
AQUAKAL 74
For Your Yarns and Fabrics

Aquakal 74 is the rapid penetrant and leveling agent that tops the list—by Graves Test and on your machines. Also used for rewetting in producing Sanforized fabrics.

•

Hydroxy Hand Cream—for the operators handling nylon to keep their hands smooth.
Two Of A Full Line Of Kali Textile Chemicals
KALI MANUFACTURING CO.
Manufacturing Chemists
427 Mover Street • Philadelphia 25, Pa.

IDAHO
Potato Starch
"THE FINEST MADE"

MAGIC VALLEY PROCESSING COMPANY
OF IDAHO
•
ST. ANTHONY STARCH COMPANY, INC.
OF IDAHO
•
MENAN STARCH COMPANY, INC.
OF IDAHO

DISTRIBUTED BY
AMERICAN KEY PRODUCTS, INC.
15 PARK ROW • NEW YORK 7, N. Y.

Laurel Brand

means

better, more efficient, lower cost finishing for your

cotton · wool · silk · rayon · nylon

For over thirty-seven years Laurel has met successfully myriad challenges of leading dyers, bleachers and finishers with better, more efficient processing agents. Ask Laurel Technicians for their recommendations.

Laurel Boil-Off Oils and Compounds · Laurel Emulsions and Softeners · Laurel Hosiery Finishes · Laurel Nylon Finishes · Laurel Rayon Oils · Laurel Textile Oil · Laurel Wool Oils · Laurel Special Finishes

soaps, oils, finishes

LAUREL SOAP MANUFACTURING CO., Inc.

Wm. H. Bertolet's Sons

ESTABLISHED 1909

WAREHOUSES:
Paterson, N. J.
Chattanooga, Tenn.
Charlotte, N. C.

OFFICES:
2601 East Tioga Street
Philadelphia 34, Pa.

The Fleet Line

TOP DYE KETTLE

BOTANY MILLS INC. IS ONE OF MANY SATISFIED USERS

Battery of machines in operation at Botany Mills Inc.

HERE'S WHY Botany Mills Inc. and many other users prefer The Fleet Line Stainless Steel Top Dye Kettle:

1. A *great reduction in maintenance cost* due to the elimination of all wood, stuffing boxes, and exterior piping; also because motor is on top—accessible and clean.
2. *Brighter and more uniform colors* and elimination of dirt and pipe scale in the bath.
3. *Uniform pressure in all spindles* due to elimination of pipe friction and use of a pressure manifold.
4. *Saving in floor space* due to self contained design.
5. *Ease in unloading.*
6. *Ready accessibility of all parts.*
7. *Simplified installation.* No special foundation required.
8. *No special winding equipment* is required.
9. *Wide adaptability.* Pressures adequate for rayon and mohair tops, as well as worsted.
10. *Flexible design.* Any length of spindle, any reasonable number and any desired arrangement.

Circular on request

RIGGS AND LOMBARD INCORPORATED

FOOT OF SUFFOLK ST., LOWELL, MASS.

RAPIDASE

for de-sizing cottons, rayons and mixed goods

•

Assures rapid, dependable de-sizing.

•

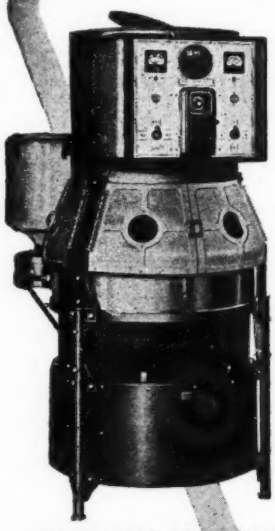
Our technical staff always at your service.

•

WALLERSTEIN COMPANY, INC.

180 MADISON AVENUE • NEW YORK 16

FADE-OMETER



• For over twenty-five years the yardstick of the Textile and Dyestuff industry for determining the light fastness of materials.
An indispensible machine for proving the light fastness of dyestuff and fabrics. Fade-Ometer tests are required by many government specifications.
Specimens are rotated around the Atlas Enclosed Violet Arc—the closest approach to natural sunlight. Temperature and humidity regulated—fully automatic in operation—perfectly safe to operate unattended over night.

ATLAS ELECTRIC DEVICES CO., 361 W. Superior St., Chicago 10, Ill.

ATLAS-OMETERS

Weather-Ometer ★ Fade-Ometer ★ Launder-Ometer

QUALITY RICHMOND PRODUCTS

Less Handling with

AFTER CHLOR

Eliminates 3 to 5 Handlings

Bleach with
Hypochlorite
Rinse and Use

AFTER CHLOR

THAT'S ALL

Write for FREE Sample

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA

RESIN EMULSIONS

POLYVINYL ACETATES

DAREX COPOLYMER X 52-L
Low molecular weight polyvinyl acetate emulsion. Requires about one third less plasticizer than high molecular weight resin for most applications. Total solids: 52-55%.

DAREX COPOLYMER X 56-L
High molecular weight polyvinyl acetate emulsion. Total solids: 53-55%.

DAREX COPOLYMER 60-L
Modified high molecular weight polyvinyl acetate emulsion adjusted to higher emulsion viscosity than X 56-L.

HIGH STYRENE RESINS

DAREX COPOLYMER NO. 3-L
Stabilized latex form of DAREX Copolymer No. 3, a 70 Styrene/30 Butadiene rubber resin. Film former and reinforcing agent. May be used either cured or uncured. Total solids: 45-47% pH 8-10.

DAREX COPOLYMER NO. X 34-L
Stabilized latex form of DAREX Copolymer No. X 34, an 85 Styrene/15 Butadiene rubber resin. Reinforcing agent for use to obtain harder, tougher films. Total solids: 45-47% pH 8-10.

AVAILABLE IMMEDIATE DELIVERY
BARRELS — DRUMS

DEWEY AND ALMY CHEMICAL COMPANY
ORGANIC CHEMICALS DIVISION
CAMBRIDGE, MASSACHUSETTS

ATCOSYN
A NEW SYNTHETIC DETERGENT
USE IT FIRST! for COTTON for WOOL for RAYON
Atlantic Chemical Co., Inc.
MAIN PLANT: CENTREDALE, RHODE ISLAND
BRANCH OFFICE: PATERSON, NEW JERSEY
Ask for complete Technical Information

• CLASSIFIED ADVERTISEMENTS •

POSITION WANTED: Colorist for machine printing 25 years experience on all types of Rayon. Married, age 46. Write Box 272.

WANTED: Executive Salesman; New Chemical Corporation seeks outstanding sales executive with integrity, contacts and following in the Textile and Allied Industries. Attractive offer. All replies confidential. Write Box 273.

POSITION WANTED: Textile Chemist, Colorist, Dyer, College graduate, eighteen years practical laboratory and plant experience, testing, formulating, color matching, dyeing all types dyestuffs on cotton, viscose, acetate, aralac and woolen materials. Practical rawstock, package and beam dyeing experience also bleaching and finishing experience and part jig dyeing cotton piece goods. Seeking position with future as superintendent dyeing. Will consider technical sales service position. Located North Carolina at present. Write Box 270.

EQUIPMENT WANTED

Scott Tester, Model J preferred. Send full details, including accessories and price to Box 271.

WANTED: DYESTUFFS—DIRECT, BASIC, VAT, INDIGO PASTE. Write Box 264.

HEAD DYER AND FINISHER WANTED TO MANAGE DYE PLANT

Must have complete knowledge and practical experience in jig dyeing, particularly in handling lastex goods. Only those with proven ability and experience need apply. Give all details in first letter. Liberal compensation to qualified person. All replies will be held in strict confidence.

Write Box 274

Additional Classified Ads on Page XXV

PENETRANTS • DETERGENTS • SOFTENERS • REPELLENTS • FINISHES

BURK-SCHIER

BURKART-SCHIER CHEMICAL CO., CHATTANOOGA, TENN.

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $7.50 per column inch or less per insertion.

CONFIDENTIAL EMPLOYMENT SERVICE—For Dyers, Chemists, Colorists, Managers, Superintendents and others seeking positions and for employers seeking men. Many positions paying attractive salaries, open for capable men. Charles P. Raymond Service, Inc., 294 Washington St., Boston, Mass. Over 45 years in business.

POSITION WANTED: Colorist, for Screen Printing. Age 26, 8 years experience on all types of Dyes and in Printing. Highly specialized on Acetates and Rayons. Write Box 253.

POSITION WANTED: Graduate Chemist with several years experience in control, research, production and supervision. Wool, felts, fur, hair, resins and enzymes. Desires laboratory, production, or technical sales. Prefer Northeastern location. Write Box 255.

WANTED: Salesman with knowledge of textile specialties, living in the South, with experience and personal contacts to cover the South for an old established firm. State age, selling experience, and other details. Very good salary to the right man. Write Box 261.

WANTED: Excellent opportunity for man 25-35 years, technically trained. Knowledge of cotton and rayon finishing to sell textile industry in New England. Write Box 262.

WANTED: Assistant Dyer with experience in dyeing hosiery. Location 60 miles from New York City. Write full details regarding experience and qualifications to Box 268.

OPPORTUNITY IN LATIN AMERICA

One of America's largest textile firms offers outstanding opportunities in Latin American Countries for high caliber men who can qualify for the following position:

RAYON DYER AND FINISHER

Must be experienced on all types of box and jig work. These positions pay attractive salaries. Men, age 25-45 preferred. Must be willing to remain in foreign countries one to two years.

Qualified applicants should submit full information giving experience, age, marital status, and references. Personal interviews can be arranged.

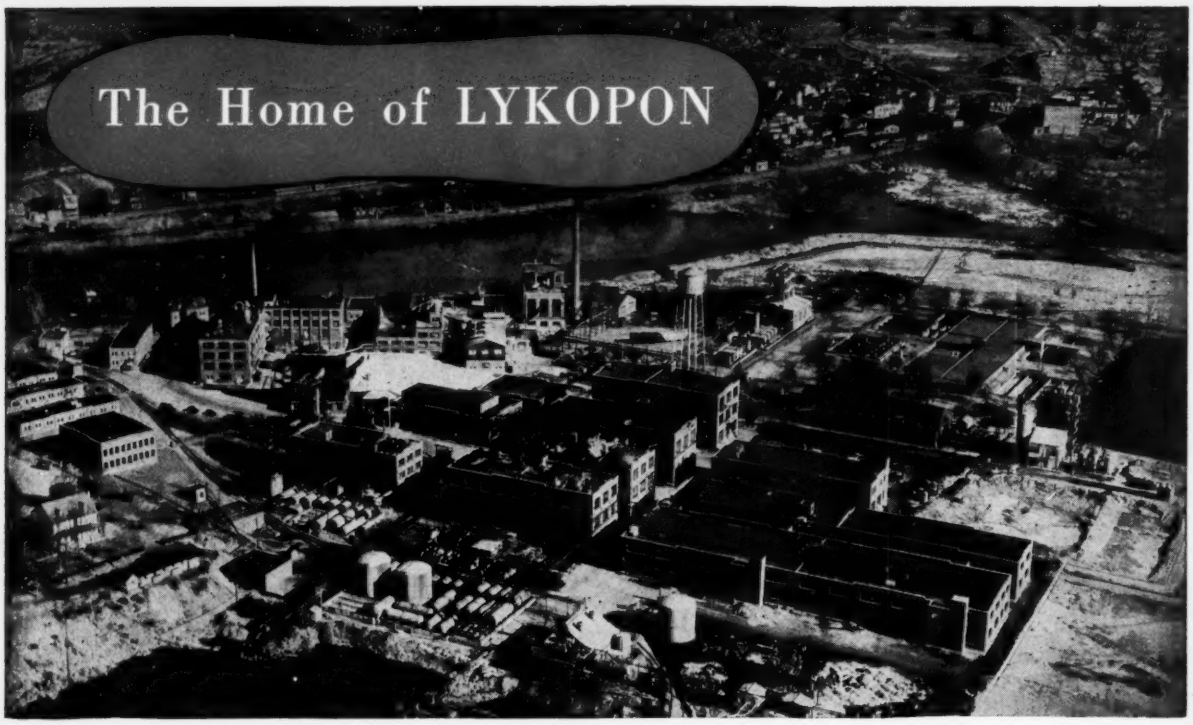
Write Box 257.

WANTED: Colorist for roller print Mill in South. Give full details of training and experience, also salary expected. Write Box 260.

FOR SALE

FADEOMETER—Serial CV 1393, used, good condition, reasonable: D.C. current. Write Box 266.

ADDITIONAL CLASSIFIED ADS ON PAGE XXIV



. . . and other reliable textile chemicals

THE SERVICE THAT BUILT OUR BUSINESS CAN HELP YOURS

Our business has been built largely on the practical help we have been able to give our customers, right in their own plants, in adapting Rohm & Haas products to their needs.

Our representatives are men with technical training and practical experience in the use of industrial chemicals. Call in a member of our textile chemicals department when you need assistance in choosing or using . . .

Chemicals For Fine Textiles

This is the Bristol, Pa. plant of the Rohm & Haas Company, where many of the long line of dependable textile chemicals are produced.

LYKOPON . . .	The first Sodium Hydrosulfite—and still the foremost.
FORMOPON . . .	Sodium Sulfoxylate Formaldehyde — the industry's standard for purity and performance.
PROTOLIN . . . PROTOLIN W . . . FORMOPON EXTRA . .	Zinc Hydrosulfite and Zinc Sulfoxylates — dependable reducing agents for stripping every fiber.
RHOZYME DX . . . RHOZYME PF . . .	Textile enzymes — stable powders for the uniform desizing of all fabrics.
RHOPLEXES . . .	Acrylic Resins in a complete range of modern finishes for quality textiles.

LYKOPON, FORMOPON, PROTOLIN, RHOZYME & RHOPLEX *are trade-marks, Reg. U. S. Pat. Off.*

Represented in Canada by Rohm & Haas Company of Canada, Ltd., Toronto; and in South America by Cia. Rohm y Haas, S. R. L., Carlos Pellegrini 331, Buenos Aires, Argentina, and agents in principal South American cities.

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Manufacturers of Chemicals including Plastics • Synthetic Insecticides • Fungicides • Enzymes • Detergents
Germicides • Chemicals for the Leather, Textile, Ceramic, Rubber, Paper, Petroleum and other Industries

MORE AND MORE DYESTUFF MANUFACTURERS ARE USING

MARASPERSE*

a group of exceptional dispersing agents

Whether you're producing acetate, pigment, or vat-colors, it will pay you to investigate MARASPERSE. Derived from the lignin component of wood, these dispersants are highly purified, non-hygroscopic, non-fermenting, free-flowing powders and free of reducing sugars.

MARASPERSE C
is calcium lignosulfonate with a pH of 7 (3% solution)

MARASPERSE N
is sodium lignosulfonate with a pH of 7 (3% solution)

MARASPERSE CB
is a partially desulfonated sodium lignosulfonate with a pH of 9 (3% solution)

We fully appreciate the specific nature of each problem involving dispersants and consequent difficulty in making general recommendations. In this connection our technical service is available for consultation and cooperative effort in the solution of your problem. Samples and supplementary literature will be supplied on request.

MARATHON CORPORATION
Chemical Division
ROTHSCHILD • WISCONSIN

*Reg. U.S. Pat. Off.

GREENVILLE PUBLIC LIBRARY
DO NOT CIRCULATE

Sales Appeal

with Drytex* NATURAL FINISH water repellent

Drytex has EXTRA qualities worth looking into. DOES NOT FOAM . . . regular, even results, always . . . MORE WAX . . . superior to ordinary wax-emulsion repellents because Drytex deposits more wax around the fibres of the fabric—makes them more impermeable to water.

Drytexed fabrics stay fresher longer—dirt stains and spots are not absorbed. Drytex, correctly applied, has a water repellent rating of 100 by AATCC Standard Test!

Drytex's EXTRA STABILITY saves you money . . . it lasts longer in storage, goes farther in solution. All these EXTRAS and natural looking, natural feeling water repellent fabrics, too. Send for a sample today.

ROYCE CHEMICAL CO.

*Reg. Trade Mark

ROYCE CHEMICAL CO.

CARLTON HILL, NEW JERSEY

MANUFACTURERS OF NEOZYME* • PAROLITE* • DISCOLITE* VELVORAY* • FABRITEX* • GUMOLITE* • CASTROLITE* VATROLITE* • ZIPOLITE*

2445A

2445A